S. HRG. 98-224, pt. 3

MISCELLANEOUS RECLAMATION LEGISLATION

HEARING

BEFORE THE

SUBCOMMITTEE ON WATER AND POWER

OF THE

COMMITTEE ON ENERGY AND NATURAL RESOURCES UNITED STATES SENATE

NINETY-EIGHTH CONGRESS

FIRST SESSION

ON

S. 483

A BILL TO PROVIDE FOR THE RELIEF OF WATER USERS DEPRIVED OF WINTER STOCK WATER ON WILLOW CREEK, IDAHO, BELOW THE RIRIE DAM AND RESERVOIR

S. 752

A BILL TO AUTHORIZE CERTAIN ADDITIONAL MEASURES TO ASSURE ACCOMPLISHMENT OF THE OBJECTIVES OF TITLE II OF THE COLORADO RIVER BASIN SALINITY CONTROL ACT, AND FOR OTHER PURPOSES

S. 1072

A BILL TO AMEND PUBLIC LAW 96-162

SEPTEMBER 15, 1983

PART 3

Printed for the use of the
Committee on Energy and Natural Resources

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CONTENTS

	Page
S. 483	2
S. 752	8
S. 1072	6

STATEMENTS

Ainsworth, Keith H., assistant general manager, Coachella Valley Water District, Coachella, Calif	249
Armstrong, Hon. William L., a U.S. Senator from the State of Colorado	21
Broadbent, Hon. Robert N., Commissioner, Bureau of Reclamation, Department of the Interior, on:	
S. 1072	38
S. 752	71
Clark, Edwin H., II, senior associate, the Conservation Foundation, Washington, D.C	262
Colbo, Keith, Northwest Power Planning Council	51
Dunn, Kenneth, director, Idaho Department of Water Resources, State office, Boise, Idaho	24
Garn, Hon. Jake, a U.S. Senator from the State of Utah	91
Goldwater, Hon. Barry, a U.S. Senator from the State of Arizona	93
Grand Valley Water Users Association, Colorado	181
Hatch, Hon. Orrin G., a U.S. Senator from the State of Utah	89
Krieger, James, director of contract administration, Metropolitan Water District of Southern California, Los Angeles, Calif	257
Laffoon, Harry, Sr., vice chairman, Colorado River Indian Tribes, Parker, Ariz.	177
McClure, Hon. James A., a U.S. Senator from the State of Idaho	20
McKeever, Ira E., president, Western Mining Operations, W. R. Grace & Co., Denver, Colo., accompanied by John Thruman, corporate vice president; and Elizabeth Surges-Murray, executive assistant	186
Nickles, Hon. Don, a U.S. Senator from the State of Oklahoma	1
O'Meara, J. W. "Pat", executive vice president, National Water Resource Association, Washington, D.C	267
Porter, John, manager, Dolores Water Conservancy District and Montezuma Valley Irrigation Co., Cortez, Colo	178
Sampson, Melvin, chairman, Yakima Tribal Council Legislative Committee, accompanied by Tim Weaver, counsel	56
Sampson, Neil, executive vice president, National Association of Conservation Districts, Washington, D.C	263
Siegel, Richard D., Deputy Assistant Secretary for Natural Resources and Environment, Department of Agriculture, accompanied by Joseph Haas, Deputy Chief, Soil Conservation Service for Natural Resource Projects	95
Sorensen, Garth, farmer, Roosevelt, Utah	184
Spencer, John F., deputy director, Washington State Department of Ecology, on behalf of Gov. John Spellman, State of Washington	41
Steiner, Wesley, director, department of water resources, Phoenix, Ariz., accompanied by Myron B. Holburt, chief engineer, Colorado River Board of California, Los Angeles, Calif.; J. William McDonald, director, Colorado Water Conservation Board, department of natural resources, Denver, Colo.; Carl L. Slingerland, staff engineer, New Mexico Interstate Stream Commission, Santa Fe, N. Mex.; Daniel F. Lawrence, director, division of water resources, Salt Lake City, Utah; Paul Schweiger, deputy State engineer, Cheyenne, Wyo.; and Jack Barnett, executive director, Colorado River Salinity Control Forum, Bountiful, Utah	142

Page

Stolte, Dennis C., assistant director, national affairs, American Farm Bureau Federation, Washington, D.C. 262
Wallop, Hon. Malcolm, a U.S. Senator from the State of Wyoming 84
Wilson, Hon. Pete, a U.S. Senator from the State of California 87
Willow Creek Water Users Group 30

ADDITIONAL MATERIAL

Report of the Environmental Protection Agency on Colorado River Salinity 273

MISCELLANEOUS RECLAMATION LEGISLATION

THURSDAY, SEPTEMBER 15, 1983

U.S. SENATE,
SUBCOMMITTEE ON WATER AND POWER,
COMMITTEE ON ENERGY AND NATURAL RESOURCES,
Washington, D.C.

The subcommittee met, pursuant to notice, at 10 a.m., in room SD-366, Dirksen Office Building, Hon. Don Nickles, presiding.

Present: Senators Nickles, McClure, Domenici, Wallop, Hecht, and Evans.

Also present: Russell R. Brown, professional staff member; and Craig Gannett, counsel for the minority.

OPENING STATEMENT OF HON. DON NICKLES, A U.S. SENATOR FROM THE STATE OF OKLAHOMA

Senator NICKLES. Good morning. Today's hearing before the Subcommittee on Water and Power will hear testimony on three bills;

S. 483, which is sponsored by Senators McClure and Symms, would provide for the relief of water users deprived of stock water on Willow Creek below Ririe Dam in Idaho.

Also S. 1027, which is sponsored by Senators Gorton and Jackson, which would amend Public Law 96-162 which authorized the Yakima River Basin water enhancement project study in the State of Washington.

Also we will hear testimony on S. 752, a bill sponsored by Senator Armstrong and the other Senators from the Colorado River Basin which would amend title II of the Colorado River Salinity Control Act of 1974.

We do have a long list of witnesses today, and so I would appreciate your cooperation in trying to expedite this hearing as quickly as possible.

Also, all written statements will be entered into the record in full so I would appreciate your summation of comments and if you could keep most of our panelists within a 5-minute timeframe that would certainly be appreciated by this Senator and others on the committee.

The committee today will take testimony in the order of S. 483, the Idaho bill, then S. 1027, the Washington bill, and then S. 752, the Colorado River bill.

[The texts of S. 483, S. 1027, and S. 752 follow:]

II

98TH CONGRESS
1ST SESSION

S. 483

To provide for the relief of water users deprived of winter stock water on Willow Creek, Idaho, below the Ririe Dam and Reservoir.

IN THE SENATE OF THE UNITED STATES

FEBRUARY 15 (legislative day, FEBRUARY 14), 1983

Mr. MCCLURE (for himself and Mr. SYMMS) introduced the following bill; which was read twice and referred to the Committee on Energy and Natural Resources

---

A BILL

To provide for the relief of water users deprived of winter stock water on Willow Creek, Idaho, below the Ririe Dam and Reservoir.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "Willow Creek Winter Stock Water Supply Act".

SEC. 2. It is the purpose of this Act to provide for the relief of water users deprived of winter stock water from Willow Creek, Idaho, below the Ririe Dam and Reservoir by the Bureau of Reclamation's authorized operation of that dam and reservoir.

SEC. 3. As used in this Act—

(1) The term "winter stock water" means drinking water used for livestock that is dependent upon flows in Willow Creek from November 15 through March 1.

(2) The term "claimant" means any water user who has been deprived of winter stock water from the main channel of Willow Creek, Idaho, below Ririe Dam and Reservoir because of the Bureau of Reclamation's operation of the dam and reservoir.

(3) The term "Secretary" means the Secretary of the Interior.

SEC. 4. (a) The Secretary is authorized to pay a claimant an amount determined under section 5 of this Act. Any payment to a claimant made under this section shall constitute full settlement and satisfaction of all claims such claimant may have against the United States relating to the loss of winter stock water from Willow Creek, Idaho. The provisions of this Act shall not apply to any claim settled prior to the date of enactment of this Act.

(b) The Secretary shall make a payment under subsection (a) to a claimant only if—

(1) the claimant notifies the Secretary of his claim within one year after the date of enactment of this Act;

(2) the claimant provides an affidavit proving his use of winter stock water from Willow Creek prior to December 31, 1979; and

(3) the claimant executes a waiver and release, in a manner satisfactory to the Secretary, of any and all claims against the United States relating to the loss of winter stock water from Willow Creek, Idaho. Such waiver and release shall be recorded in the county where the claimant's land is located.

SEC. 5. (a) Any claimant who has developed an alternate winter stock water supply since December 31, 1979, shall be eligible for a payment under section 4 of an amount equal to the actual construction costs incurred by such claimant in the development of such supply, as determined by the Secretary.

(b) Any claimant who has not developed an alternate winter stock water supply at the date of enactment of this Act, shall be eligible for a payment under section 4 of an amount equal to the funds necessary for the development of such supply, as determined by the Secretary. The Secretary's determination shall be based on the size and configuration of the claimant's land and on the size and type of the claimant's livestock operation.

(c) Costs and expenses incurred by a claimant in the operation and maintenance of his alternate winter water stock supply shall not be reimbursable.

SEC. 6. There is authorized to be appropriated an amount not to exceed $300,000 to carry out the provisions of this Act.

○

II

98TH CONGRESS
1ST SESSION

S. 1027

To amend Public Law 96–162.

IN THE SENATE OF THE UNITED STATES

APRIL 12, 1983

Mr. GORTON (for himself and Mr. JACKSON) introduced the following bill; which was read twice and referred to the Committee on Energy and Natural Resources

---

A BILL

To amend Public Law 96–162.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That Public Law 96–162 (relating to the Yakima River Basin Water Enhancement project-feasibility study) (93 Stat. 1241) is amended by adding a new section at the end thereof:

"SEC. 2. If the State of Washington, prior to an authorization (or the providing of an appropriation of funds to the Department of the Interior) to construct the Yakima River Basin Water Enhancement project, constructs any physical element of that project, including any reregulation dam or fish passage facility, the costs incurred by the State in construction of such elements shall be credited to the total

amount of any costs to be borne by the State as contributions toward payment for cost of the project; except that, no such credit shall be given to any element constructed by the State unless the element was approved by the Commissioner of the Bureau of Reclamation prior to its construction. The Commissioner shall grant such an approval, when requested by the State of Washington, if it appears the element proposed for construction is an integral part of the project. All approval elements constructed by the State, as provided in this section, shall be included as a part of the project previously directed for feasibility determination study by the first section of this Act.".

II

98TH CONGRESS
1ST SESSION

S. 752

To authorize certain additional measures to assure accomplishment of the objectives of Title II of the Colorado River Basin Salinity Control Act, and for other purposes.

IN THE SENATE OF THE UNITED STATES

MARCH 10 (legislative day, MARCH 7), 1983

Mr. ARMSTRONG introduced the following bill; which was read twice and referred to the Committee on Energy and Natural Resources

---

A BILL

To authorize certain additional measures to assure accomplishment of the objectives of Title II of the Colorado River Basin Salinity Control Act, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Colorado River Basin Salinity Control Act (43 U.S.C. 1571 et seq.) is amended—

(1) at the end of section 201(a) (43 U.S.C. 1591(a)), by adding the following new sentence: "Actions under this title shall not be governed by the principles, standards, and procedures for planning water and related land resources promulgated pursuant to the

Water Resources Planning Act (42 U.S.C. 1962 et seq.).";

(2) at the end of section 201(b) (15 U.S.C. 1591(b)), by adding the following new sentence: "In determining the relative priority of implementing additional units or new self-contained portions of units authorized by section 202, the Secretary shall give preference to those additional units or new self-contained portions of units which reduce salinity of the Colorado River at the least cost per unit of salinity reduction.";

(3) before the beginning of the first sentence of section 202 (43 U.S.C. 1592), by inserting "(a)";

(4) in the second sentence of paragraph (2) of section 202(a) (43 U.S.C. 1592(a)(2)), by inserting "replacing canals and laterals with pipe, implementing other measures to reduce salt contributions from the Grand Valley to the Colorado River," after "canals and laterals,";

(5) in paragraph (2) of section 202(a) (43 U.S.C. 1592(a)(2)), by striking out the fourth, fifth, and sixth sentences;

(6) in section 202(a) (43 U.S.C. 1592(a)), by adding at the end thereof the following new paragraphs:

"(5) Stage I of the Lower Gunnison Basin unit, Colorado, consisting of measures and all necessary, appurtenant, and associated works to reduce seepage from canals and laterals in the Uncompahgre Valley, essentially as described in the status report dated July 1981.

"(6) The McElmo Creek unit, Colorado, consisting of measures and all necessary, appurtenant, and associated works to reduce seepage from canals and laterals in the Montezuma Valley, essentially as described in the status report dated July 1981.

"(7) Stage I of the Uinta Basin unit, Utah, consisting of measures and all necessary, appurtenant, and associated works to reduce seepage from canals and laterals in the Uinta Basin, essentially as described in the status report dated July 1981.

"(8) The Palo Verde Irrigation District unit, California, consisting of measures and all necessary, appurtenant, and associated works to reduce seepage from canals and laterals in the Palo Verde Valley, essentially as described in the special report dated July 1981.

"(9) Saline water use and disposal opportunities unit, consisting of measures and all necessary, appurtenant, and associated works to demonstrate saline water use technology and to beneficially use and dispose of saline and brackish waters of the Colorado River Basin in joint ventures with

current and future industrial water users, using the concepts generally described in the Secretary's special report of September 1981 entitled 'Saline Water Use and Disposal Opportunities'.

"(10) Sinbad Valley unit, Colorado, including all necessary and appurtenant works, to minimize to the extent practicable salt contributions to the Colorado River from lands administered by the Bureau of Land Management in Sinbad Valley, essentially as described in the 1978 through 1979 Bureau of Land Management salinity status report dated February 1980.";

(7) at the end of section 202(a) (43 U.S.C. 1592(a)), as amended by paragraph (6), by adding the following new subsection:

"(b) In implementing the units authorized to be constructed pursuant to subsection (a), the Secretary shall carry out the following directions:

"(1) Prior to initiating construction of works pursuant to this subsection and subsection (a), and where the Secretary determines that implementing a unit or portion thereof in joint venture with non-Federal entities is in the best interest of the United States, the Secretary shall enter into contracts or agreements with legally qualified participating entities, as defined in the Reclamation Project Act of 1939 (43 U.S.C. 485 et

seq.), and with industrial water users, as provided for in subsection (a)(9). Such contracts or agreements shall define the responsibilities of the various participants for financing, construction, operation, and maintenance of facilities constructed under the authority of this subsection and subsection (a) to the end that the maximum reduction of salinity of the Colorado River will be achieved. Such cost as the United States shall incur pursuant to such contracts or agreements shall represent an equitable apportionment of the total cost of the facilities among the various participants based upon benefits received. Such contracts or agreements are to be effective for any fiscal year only to such extent or in such amounts as are provided in appropriation Acts.

"(2) The Secretary may not assume, under the authority of this title, long-term operation and maintenance obligations for facilities constructed or measures undertaken to replace incidental wildlife values and canal and lateral systems constructed pursuant to this title, except that the Secretary is authorized to provide continuing technical assistance to assure the effective operation and maintenance of such measures and systems.

"(3) In areas where canal and lateral improvement salinity control measures are authorized pursuant

to subsection (a), the Secretary is also authorized under this title to improve additional portions of interconnected canal and lateral systems where the cost of such additional facilities will be repaid in a manner satisfactory to the Secretary. In determining that such additional measures should be undertaken, the Secretary shall utilize the procedures that govern justification of projects undertaken pursuant to the Small Reclamation Projects Act of 1956 (43 U.S.C. 422a et seq.). In establishing repayment responsibilities, the Secretary shall give recognition to any incidental salinity benefit that would accrue from such measures, related costs to be assigned to salinity control purposes and allocated and repaid as provided in section 205 of this title, except that in the case of facilities serving Indian lands, any repayment of costs pursuant to this title shall be subject to the Leavitt Act (25 U.S.C. 386a).

"(4) If the Advisory Council established pursuant to section 204(a) of this title requests, and the Governor of the State where the measures are to be implemented concurs, any salinity control unit or discrete portion thereof authorized by section 202 of this title may include measures to replace incidental wildlife values foregone as a result of constructing that unit or discrete portion thereof, except that—

S 759 IS

28-181 O - 84 - 2

"(A) such measures shall not significantly diminish the salinity improvement to be achieved by the unit;

"(B) use of water for such measures shall be in accordance with State water law;

"(C) to the extent practicable, the measures undertaken shall minimize the use of water; and

"(D) the cost of such measures shall be only a minor part of the total cost of each salinity control unit or separable portion thereof.

"(5) As reports are completed describing final implementation plans for units 5 through 10 or portions of these units authorized by section 202(a), prior to expenditure of funds for related construction activities, the Secretary shall submit such reports to the appropriate committees of the Congress and to the Governors of the Colorado River Basin States in the manner provided for revision of projects pursuant to section 208(a) of this title.";

(8) at the end of section 202(b) (43 U.S.C. 1592(b)), as added by paragraph (7), by adding the following new subsection:

"(c)(1) The Secretary of Agriculture is authorized and directed to establish as described in this subsection a voluntary cooperative program with private landowners to improve

on-farm water management and reduce watershed erosion on non-Federal lands and on lands under the control of the Department of Agriculture for the purpose of assisting in meeting the objectives of this title.

"(2) In carrying out such program, the Secretary of Agriculture shall—

"(A) identify salt-source areas and determine the salt load resulting from irrigation and watershed management practices;

"(B) develop, in consultation with the public and affected governmental interests, plans for implementing measures that will reduce the salt load of the Colorado River by improving on-farm irrigation water management including improvement of related laterals and by improving watershed erosion management practices, such measures to include replacement of incidental wildlife values in the manner described in subsection (b)(4);

"(C) provide technical and cost-sharing assistance for the voluntary implementation of plans through contracts and agreements with individuals or groups of owners and operators of farms, ranches, and other lands as well as with local governmental and nongovernmental entities such as irrigation districts and canal companies, except that a portion of the costs of

implementing such plans shall be shared by the participants on the basis of benefits received and other appropriate factors, as determined by the Secretary of Agriculture, and except that such contracts and agreements shall provide for continuing operation and maintenance of measures installed under this subsection;

"(D) provide continuing technical assistance for irrigation water management as well as monitoring and evaluation of changes in salt contributions to the Colorado River to determine program effectiveness; and

"(E) carry out related research, demonstration, and education activities.

"(3) The measures to be implemented in any particular salt source area shall be described in reports issued by the Secretary of Agriculture. Copies of the reports are to be submitted to—

"(A) committees of the Congress having jurisdiction over programs of the Department of Agriculture;

"(B) members of the Advisory Council established by section 204(a) of this title; and

"(C) the Governor of any State where measures are to be implemented.

No funds for implementation of proposed measures undertaken pursuant to this subsection may be expended until the expiration of sixty days after submission of the report of the

Secretary of Agriculture, and not then if such report is disapproved by the receiving committees of the Congress, the involved Governor, or the Advisory Council. Measures included in any report shall be programed for completion within ten years unless a longer period is concurred in by the Advisory Council.

"(4) The Secretary of Agriculture shall use existing agencies, as well as the Commodity Credit Corporation, to carry out the provisions of this title. There are authorized to be appropriated and expended, based on April 1981 prices, plus or minus such amounts as may be justified by reason of ordinary fluctuations in construction cost involved therein, to carry out the provisions of this subsection for the fiscal year 1984, $21,500,000; for the fiscal year 1985, $28,600,000; for the fiscal year 1986, $31,700,000; for the fiscal year 1987, $35,000,000; for the fiscal year 1988, $35,000,000; for the fiscal year 1989, $29,000,000; and such additional sums as may be necessary except that such sums as have been or shall be appropriated shall remain available until expended.

"(5) The Secretary of Agriculture may not assume continuing operation and maintenance obligations for permanent salinity control measures constructed on non-Federal lands pursuant to this title.";

(9) in section 203(b) (43 U.S.C. 1593(b))—

(A) by striking out the period at the end of paragraph (2) and inserting in lieu thereof "; and"; and

(B) by adding at the end thereof the following new paragraph:

"(3) to develop a comprehensive program for minimizing salt contributions to the Colorado River from lands administered by the Bureau of Land Management and submit a report which describes the program and recommended implementation actions to the Congress and to the members of the Advisory Council established by section 204(a) of this title by July 1, 1984.";

(10) in section 205(a) (43 U.S.C. 1595(a)), by inserting "(herein defined to exclude costs borne by non-Federal entities pursuant to paragraphs (1), (2), and (3) of section 202(b) and pursuant to section 202(c)(1)(C)) of the on-farm programs, measures and" after "total costs";

(11) in section 205(a)(3) (43 U.S.C. 1595(a)(3)), by inserting "or the estimated life of the facility, whichever is less," after "fifty-year period";

(12) in section 208, by striking the first sentence;

(13) in the second sentence of paragraph (b) of section 208 (43 U.S.C. 1598(b)), by striking out "sec-

tion 202" and inserting in lieu thereof "sections 202(a) and 202(b)"; and

(14) after the second sentence of subsection (b) of section 208 (43 U.S.C. 1598(b)), by inserting the following new sentence: "The funds authorized to be appropriated by this section may be used for construction of any or all of the works or portions thereof and for other purposes authorized in subsections (a) and (b) of section 202 of this title.".

SEC. 2. The amendments made by this Act shall take effect on October 1, 1983.

Senator NICKLES. Senator McClure, we're glad you're here. We appreciate your participation. Do you have any opening comments that you wanted to make?

STATEMENT OF HON. JAMES A. McCLURE, A U.S. SENATOR FROM THE STATE OF IDAHO

The CHAIRMAN. Thank you, Mr. Chairman. I really am pleased that your subcommittee is holding a hearing on the bill that was introduced by Senator Symms and me to correct a problem which has perplexed and damaged a relatively small group of our constituents who are engaged in farming and ranching along Willow Creek in Bonneville County, Idaho. While their number is small, the problem is serious nonetheless, because it involves yet another example of citizens who have lost faith in their Government because it has promised them one thing and done another.

The problem to which I am referring can be stated rather briefly. Ririe Dam is a Bureau of Reclamation facility on Willow Creek, which is operated with its associated facilities in part as a flood-control project. Keeping Willow Creek and the flood channel free of ice during the winter when low temperatures cause ice buildup is indeed a crucial part of the project's authorized operation. In order to facilitate that, however, the Bureau's policy is to release no water from Ririe Dam during these cold winter months. The result of this is to deprive landowners adjacent to Willow Creek of the only available water source for their livestock during these months.

The farmers and ranchers affected by this situation argue that they were assured and promised by the Government prior to construction of the dam that their stock-watering rights would not be harmed, and in fact these representations were part of the basis on which the landowners' support for the construction of the dam was founded in the first place. Sixteen claims were filed against the Bureau on the grounds that its operation of Ririe Dam has deprived the adjacent landowners of their stock-watering rights during the critical winter months. The Bureau's field solicitor denied these claims, suggesting that the landowners had no legitimate right to water for stock-watering purposes at all and therefore no claim against the Government.

I do not believe it is or should be up to the Bureau of Reclamation to be the arbiter of whether a valid water right exists under State law. I am told by several experts in the State that such a stock-watering right without diversion does indeed exist under Idaho law, or is at least an open question. But these people have neither the time nor the resources to pursue the point in court while no telling how many years pass in which they have no source of winter drinking water for their livestock. Regardless of the existence of a water right, these people have a genuine problem which I believe equity demands that we solve.

I appreciate you hearing this matter this morning.

Senator NICKLES. Thank you. I notice also we have Senator Armstrong who is in the wings and I believe wishes to make some opening comments on the of bill which he is the principal sponsor, S. 752, so it would be appropriate at this time Senator, if you wish to make some comments.

STATEMENT OF HON. WILLIAM L. ARMSTRONG, A U.S. SENATOR FROM THE STATE OF COLORADO

Senator ARMSTRONG. It is my desire to make the briefest opening statement that has ever been heard by this committee, mainly just to say thank you for having a hearing on this matter. I know that you and other members of the subcommittee are very familiar with the significance of the salinity control legislation. And the reality is as I point out in some detail in a written statement which I have submitted is the salinity problem of the Colorado River is not only terribly serious, it's growing steadily worse and poses not only an economic problem but a problem of international relations, potential health hazard, and it's time to get on with it and we think that the legislation which a number of us out West have introduced, in fact I believe virtually every Senator from the States affected is a cosponsor. It does this in a very straightforward and proper manner.

I appreciate your accommodating me. I'm on my way to preside at another hearing in a moment and I just wanted to come by and express in a personal way how much we appreciate your interest and how important we think this legislation is.

[The prepared statement of Senator Armstrong follows:]

Statement by
William L. Armstrong
Before the Water and Power Subcommittee
of the Energy and Natural Resources Committee
September 15, 1983

I would like to begin, Mr. Chairman, by thanking you for scheduling hearings for the consideration of S. 752, which is designed to advance the purposes of the Salinity Control Act of 1974. Other witnesses will speak to this legislation in considerable detail, so I would like to speak briefly of its overall importance and general approach.

Seventeen million people from Denver to San Diego depend on the waters of the Colorado River, which irrigate 1.5 million acres of rich farmland, provide clean hydro-electric power, offer a diversity of recreational opportunities, and furnish our homes and factories with one of life's essentials. In short, the Colorado is one of the country's most relied upon rivers.

It is also a mighty and powerful element. Since Hoover Dam was finished, many water impoundment structures have been placed across the river and you often hear that it has been "tamed." This was revealed as a naive notion in recent months, when the spring run-off was twice its normal volume of 6.9 million acre-feet. Water crashed down the spillways of the Colorado's major dams and caused floods that killed several people and inundated farmland, resorts and parts of cities along its length. Water surged through Hoover Dam's spillways at the rate of 44,000 cubic feet per second -- more than three times the river's normal flow for that time of year. Six California and Arizona counties were declared federal disaster areas, homes and businesses were damaged or destroyed, livestock was lost and crops ruined, and the generation of hydro-electric power was disrupted. In all, the economic damage has been tentatively estimated at more than $25 million.

But this river also caused a different kind of damage last year... damage that was harder to perceive, but much more serious. High salinity levels in the Colorado River caused $100 million worth of damage -- four times the cost of the flood damage — to irrigation agriculture and to municpal and industrial water users. This staggering damage toll is expected to.more than double (in constant dollars) by the year 2000 unless tough salt pollution control measures are taken now.

The fact of the matter is that this magnificent river is being slowly poisoned by salt, a common element naturally occurring in many western soils. Colorado River salinity has two major causes: salt loading, which comes from contact with these western soils and salty mineral springs, and salt concentrating, which is caused by natural evaporation and the increasing consumptive use of the river as the seven western States it traverses continue to develop.

To put this problem in perspective, consider that the river has only 50 parts of salt per million parts of water (PPM) at its headwaters high in Colorado's Rocky Mountains. But by the time it reaches Imperial Dam near our border with Mexico, that level has increased over 1,600 percent to more

than 900 PPM. That level is well above the 500 PPM maximum recommended under the Environmental Protection Agency's drinking water standards. Historically, salinity levels have trended steeply upward; from 1941 to 1981, they increased an average of 3.9 PPM every year, as measured at Imperial Dam.

In addition to the readily calculated economic damages I have discussed, Colorado River salinity causes serious environmental losses, damage to some of this country's most important fish and wildlife habitats and an increasingly serious threat to public health. The situation is clearly bad enough already, but the Bureau of Reclamation estimates that the salinity level of the river will climb more than 50 percent by the turn of the century to 1,200 PPM — more than double the maximum recommended by EPA.

This is obviously a serious Western problem, but it is also a serious national issue. Salinity is the southwestern equivalent of the northeast's acid rain. Both pose dangerous water quality threats to a large portion of the country and both need to be placed high on the national problem-solving agenda. Morever, both have significant repercussions in our good relations with out two continental neighbors. Just as acid rain creates continuing friction with Canada, so Colorado River salinity remains an issue between this country and Mexico. By the time the Colorado crosses into Mexico, it is one of the most saline rivers in the world. We have a treaty obligation with that country which strictly limits salinity levels and we are under constant pressure to reduce those levels further. This legislation will send a clear message to our important neighbor to the south that we value our special relationship with them and are determined to improve it further.

This bill has four principal objectives. First, it authorizes six new salinity control units, to be constructed by the Department of the Interior within the funding ceiling established by the Salinity Control Act of 1974. Four of these are ordinary off-farm control measures designed to reduce contact between saline soils and the waters of the Colorado, typically by lining irrigation canals and laterals or enclosing them in pipe. Another unit involves, for the first time, Bureau of Land Management land. The last of the six new new off-farm units gives the Department of the Interior flexible authority to demonstrate new technologies for disposing beneficially of this waste saline water.

Second, this legislation authorizes five new on-farm control units and implements a more effective salinity program to be administrated by the Department of Agriculture. This program will be entirely voluntary in nature and will be pursued cooperatively with private landowners. An on-farm unit typically consists of installing automated irrigating systems to improve water management and reduce the washing of more salt into the river.

Third, the bill provides for cost-sharing arrangements, so that the Federal Government will be reimbursed by water users for all but the benefits from salinity reduction.

Fourth, provision is made for the replacement of incidental wildlife and other environmental values that may be impaired due to construction of these salinity units.

Mr. Chairman, this measure is unanimously supported by the seven Colorado Basin States Basin States of Wyoming, Colorado, New Mexico, Utah, Nevada, Arizona, and California. I am also happy to report that S. 752 enjoys the unanimous support of the fourteen Senators from the Colorado River Basin.

In closing, Mr. Chairman, I would like to commend to you the testimony you will hear today from the States and water interests affected by this problem of salt pollution. I would also like to thank you again for the opportunity to appear before the Committee in support of this legislation, which I believe merits prompt and favorable consideration.

Senator NICKLES. We appreciate your strong leadership in this area. Thank you.

The first panelist we have will be Commissioner Broadbent, Bureau of Reclamation, and also Kenneth Dunn, director of Idaho Department of Water Resources on S. 483.

Commissioner, we appreciate your willingness to appear before this committee as you have on many occasions.

Please proceed.

Commissioner BROADBENT. Mr. Chairman, and Senator McClure. I don't know whether I have good news or bad news. The administration, I'm not yet in possession of an administration-cleared statement and so what I think I would like to indicate to you is that we would be happy to work with the members of the committee in getting a cleared statement and get it to you as quickly as we can.

The CHAIRMAN. Mr. Chairman, might I make just this comment?

I recognize the struggle that's going on downtown right now, the discussion perhaps is the better way of putting it, in which the Department of the Interior and your office is in support of this legislation and OMB has not yet satisfied themselves that they are. I think it would be good to reflect at this point for the record where the lack of decision is, and I don't ask you to comment on that.

Senator NICKLES. Thank you.

Mr. Dunn.

STATEMENT OF KENNETH DUNN, DIRECTOR, IDAHO DEPARTMENT OF WATER RESOURCES, STATE OFFICE, BOISE, IDAHO

Mr. DUNN. I'm happy to report to you the State of Idaho has reached an administrative decision on this matter and I'm here to report it.

Mr. Chairman, the land adjoining Willow Creek in Idaho were some of the earliest developed lands in the State. Willow Creek itself was essentially fully appropriated by 1888, and in 1901 there was a decree of water rights entered into in a decision called *Eagle Rock and Willow Creek Water Company* v. *Henry Habrin.* The court found in that decree that there are some beneficial purposes and in one short quote they say, "Have used the same for beneficial purposes for agricultural, domestic, and stock-raising purposes." While the court would not quantify that the raising of stock was an absolute entitlement, it's clear that they recognized that water was being used for that purpose.

Until 1971 in our State a person could establish a water right merely by using the water, without filing a claim in the State of Idaho. Since 1971 we've had a mandatory permit system which requires that the only method of obtaining new water rights is through obtaining a permit through the State of Idaho, but these old claim rights exist. The State has recently completed a program of mandatory registration of those claims so that we have an idea for planning purposes how many of these user constitutional rights as we refer to them, might exist in the State.

But as part of that mandatory claim registration program, the policy of the department of water resources of which I'm the director, is that stock watering does not require the mandatory submis-

sion of the claim. We recognize stock watering just as we do domestic right, and that is we say they have the right, it's not mandatory that they file a claim, and we believe it's not in the public interest in this State to go through the full development stage of a water right issue would for an agricultural right and that is to put in water from the stream so that you can say you physically diverted it. We don't believe that's in the interest of the person using the water nor is it in the interest of the stream to have several thousand diversions take place.

So because of that we've said it's not necessary to record those rights and it's not necessary to make a diversion. I, as the director, in improving other water rights, require that anybody taking water from the stream past sufficient water for stock water. It's been our policy in the State and we think it's a good policy.

The Bureau of Reclamation in the operation of Ririe does shut off all stock water in the wintertime when it freezes because without that you get into a flood control problem because of icing that occurs in that stream. At the time of construction of the Ririe and prior to that it was an understanding that there be a provision made for stock watering. Subsequent to that time the Bureau informed the water users that they would shut the water off.

The water master on Willow Creek who is under my supervision informed the Bureau of Reclamation at that time that he would not allow that to occur. There was some agreement finally reached that they would go into negotiations and solve the problem to the satisfaction of the United States and the water users. As Senator McClure mentioned, the subsequent solicitor's opinion was they didn't have the water right and it's my opinion that they can't make such an opinion because that's a determination of the State of Idaho.

As the administrator of the water rights system in Idaho I believe they do have a water right. The only question would be whether they would be forced to go to court and have them specifically identified in a lengthy and expensive legal process.

In issuing the water right before the Bureau of Reclamation on Ririe Dam, when I signed that, there were some conditions applied to that now existing permit and it was that they recognize all existing water rights including stock watering. The Bureau of Reclamation accepted those conditions at their operating reservoir, and I believe their acceptance and nonappeal of that permit, that they have in fact recognized that stock water rights exist.

Mr. Chairman, I would urge that your subcommittee and the Congress of the United States pass this bill and restore some semblance of the water rights for the people that have been injured in the State of Idaho on Willow Creek.

Thank you.

[The prepared statement of Mr. Dunn follows:]

TESTIMONY ON SENATE BILL 483

BEFORE SUBCOMMITTEE ON WATER AND POWER
COMMITTEE ON ENERGY AND NATURAL RESOURCES

SEPTEMBER 15, 1983

Mr. Chairman, my name is Kenneth Dunn, I am the Director of the Idaho Department of Water Resources and am here today representing both the Idaho Water Resource Board and the Department of Water Resources.

The lands adjoining Willow Creek, Idaho downstream from the existing Ririe Dam were among the earliest developed lands in southeastern Idaho. The summer flows of Willow Creek have been fully appropriated since 1888. The water rights were adjudicated in 1901 in the Eagle Rock and Willow Creek Water Company v. Henry W. Kiefer et al decree. The court found that those persons named in the decree ". . . have used the same for beneficial purposes, to-wit: agricultural, domestic and stock raising purposes . . . ." While the court did not quantify the stock raising and domestic entitlements, it is clear that those using water from Willow Creek have water rights dating back to before 1888.

Until 1971 a surface water right in Idaho could be established by diverting and beneficially using water. Prior to that time a mandatory permit system for the appropriation of surface waters did not exist. Since 1971 Section 42-1031, Idaho Code, has provided that the only method of establishing a new water right has been by obtaining a permit from the state. The Department of Water Resources recently completed a program of requiring the filing of a "claim to a water right" for all of the old "constitutional" or "use" water rights. The point of this is that the policy of the Department is that the filing of a claim for stockwatering purposes was not

required. Our policy is that waters of stock is essential for the economic well being of the cattle industry, and that it is not in the public interest to have required a permit and subsequent diversion works to divert water from the stream to perfect a stockwatering right. The physical damage that would occur to the streams does not justify the benefit obtained from recording the relatively small amounts of water and requiring a diversion structure to be placed in a stream.

In 1978, when the Bureau of Reclamation announced its plans to shut off the flow of Willow Creek during the winter as part of the flood control operation incorporated in Ririe Reservoir, they were advised by the watermaster of Water District 01 that he would not allow the winter shut off because of interference with Willow Creek water rights, which were the stockwatering rights that S. 483 will mitigate. Discussions between the water users and the Bureau of Reclamation resulted in agreement that Willow Creek could be shut off to prevent ice buildup in the channel with the understanding that the Bureau of Reclamation would mitigate the loss of water. The Bureau of Reclamation made a subsequent determination that a water right did not exist for stockwatering and has, therefore, not mitigated the loss. Each winter, water has been turned out of Willow Creek by closing the gates of Ririe Dam depriving the downstream users of their water without compensation.

The Department of Water Resources in issuing a water right to the Bureau of Reclamation for storage behind Ririe Dam conditioned the permit to provide that all existing water rights, including stockwatering, had to be recognized by the Bureau. Acceptance of these conditions suggests that the Bureau does agree that the stockwatering rights exist.

The United States has not acted in good faith to mitigate for the taking of property rights from certain citizens of the state of Idaho. Passage of S. 483 will provide the funds for fulfilling a promise by compensating the taking of these private rights along Willow Creek.

Senator NICKLES. Let me ask a couple of questions, Mr. Dunn. When was the Bureau project built?

Mr. DUNN. This was constructed in the early 1970's.

Senator NICKLES. Did the landowners that were on the stream, did they foresee or did the Bureau tell them at that time that the water would be shut down for the winter months?

Mr. DUNN. It's my understanding that, excuse me, I wish to go back. It's actually the Corps of Engineers. The corps built the dam and the Bureau ended up operating it for reclamation purposes.

It's my understanding that the farmers were told that their water rights would not be interferred with and stock watering would be provided.

Senator NICKLES. They were told that and then when did they find out they would lose their water rights?

Mr. DUNN. After the dam was completed and the notice was provided that the reservoir, that the gates would be closed to prevent icing in the channel downstream.

Senator NICKLES. Do you concur with that action by the Bureau? Is it necessary to do that to prevent the icing?

Mr. DUNN. Yes it is. Without that you would lose all the flood control features of the facility. That has been a recognized thing.

Senator NICKLES. This has been going on for how many years?

Mr. DUNN. This has been going on since the mid-1970s. I'd say probably 10 years.

Senator NICKLES. In 10 years those landowners who are downstream who were expecting that they had water rights during the winter months, found that they no longer do?

Mr. DUNN. That's correct. And they tried to negotiate on a solution and have not been able to do that. Many of them are now hauling water. Some of them have built their own wells because they had no other alternative.

Senator NICKLES. How many landowners are we talking about?

Mr. DUNN. I don't know the exact number. My recollection is somewhere in the twenties.

Senator NICKLES. About twenty-some?

Mr. DUNN. Yes, that's my recollection.

Senator NICKLES. During this 10-year period of time some of them hauled water and some of them drilled their own wells?

Mr. DUNN. Yes. They've all had to bring water in some way, and I don't know who is doing what but they have to bring winter water in either by drilling wells or hauling water or bringing it in another supply system.

Senator NICKLES. Did those people oppose construction of the dam?

Mr. DUNN. No, they did not because they didn't feel they were going to be injured. They supported the dam and one of the reasons they supported it was because it was their understanding that they would not be injured when in fact they have been.

Senator NICKLES. Did the corps give them the impression that there would be no shut off during the winter months?

Mr. DUNN. I don't believe they did that. I don't know the circumstances. I know that other dams in which the corps has built and say the Bureau has—in trying to put in an irrigation system, that there seems to always be that kind of a problem of one agency

having said something and the other agency being responsible for trying to negate it. I suspect this is one of the cases that nobody really understood what was happening to them.

Senator NICKLES. This bill calls for authorization of $300,000?

Mr. DUNN. Yes, sir.

Senator NICKLES. How was that figure computed?

Mr. DUNN. I don't know how it was figured.

Senator NICKLES. The number of participants, you're talking about what, $10,000 or $12,000 per landowner?

Mr. DUNN. If a well had to be drilled that would certainly be a reasonable figure.

Senator NICKLES. On a cost per well?

Mr. DUNN. Yes, sir.

Senator NICKLES. How deep is your underground water?

Mr. DUNN. In that area they would probably be perhaps 150 feet to well bed. It could be 150 to 200 feet. There are artesian pressures so the pumping level may not be that high.

Senator NICKLES. Some of these landowners have already drilled their wells so this would be reimbursing them for an expense that they made several years ago?

Mr. DUNN. Yes, sir.

Senator NICKLES. And possibly some of them have not?

Mr. DUNN. Some of them have put in some temporary measures just to get by.

Senator NICKLES. Does the bill as it's written, I'm not as familiar with it as I should be, but does this eliminate forever the total liability of the Federal Government in this case?

Mr. DUNN. To my knowledge, yes it would.

Senator NICKLES. Senator McClure, do you have any questions?

The CHAIRMAN. Mr. Chairman, I have a statement of the water users. They had intended to be able to be here at this hearing but were unable to do so and asked that I make their statement a part of the hearing record at this time.

Senator NICKLES. It will be included in the record.

[The prepared statement of the Willow Creek Water Users Group follows:]

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STATEMENT

We, the undersigned, appreciate the opportunity of submitting our statement in writing, rather than appearing in person in support of Senate Bill 483 and House Resolution 1780.

We are farmers who operate farms along Willow Creek near Idaho Falls, in Bonneville County, Idaho, and are directly affected by the Government's construction and operation of the Ririe Dam and Reservoir, which was authorized by Pub. Law 87-874, Flood Control Act of 1962, 87th Congress, Second Session.

We have been deprived of our winter water rights, without just compensation, and contrary to the representations of the Government made in the public information meetings in the planning stages of said dam and reservoir.

Willow Creek and a tributary, Sand Creek, are fed by warm springs that provide water available the year round. The lands near these warm creeks were settled upon early, by Pioneer forefathers and predecessors in title, because of the availability of domestic water and water for livestock through the winters, in addition to irrigation water, and this also resulted in early water rights.

We are the successors in interest of people whose water rights were decreed, which decrees provide for domestic, stockwatering and irrigation. Those water rights were initiated and vested in 1880 and constitute some of the earliest water rights in the area. Premiums were paid for the lands along Willow Creek because of the advantageous water supply, both summer and winter. In no part of those

water decrees is there a limitation on the use of the water for summer purposes only. As a matter of fact, never in the history of those decreed water rights had anyone ever questioned our rights to use the water both winter and summer, until a couple or three years ago, when the Idaho State Department of Water Resources notified all water users in the Snake River Valley that because the statutes of the State of Idaho referred to the irrigation season as being from April 1 to November 1, all decrees would be interpreted to involve irrigation for that specified irrigation season.

However, the Department did accept claims to winter water rights filed with it by all those users claiming winter water rights and a great multitude of claims were so filed. The use of water for domestic purposes, which includes stockwatering, has the highest priority of all types of uses under Idaho law and the Idaho Constitution. As a rule, water users with decrees such as ours, which had no limitations in the time of use, and specified that the decree was for domestic and irrigation purposes, disagree with the Department's interpretation, but have not filed actions in the court for a judicial interpretation because the Department has accepted the filing of claims to water rights under Idaho law.

Representatives of the Government nad several informational meetings and personal contacts with us in the planning stages of the Ririe Dam and Reservoir. They were all very much aware of our use of the waters of Willow Creek for both winter and summer purposes and, in many discussions, assured us that our rights would be protected and that we would continue to have our winter water rights as well. After

the dam and reservoir were constructed, the Government made the decision to close the gates of the dam during the winter months to avoid icing of the Willow Creek Channel which had now been straightened, riprapped with rock and otherwise changed. When we complained of the loss of our usage of that water, we were advised that the Regional Counsel for the Department of the Interior had given the legal opinion that we had no winter water rights because there had been no diversion as required by Idaho law, as he interpreted it.

A brief on this question was prepared by our attorney, and the same accompanies this statement. In effect, domestic water rights, including stockwatering, is a use recognized by Idaho law, and as stated before, is the use which has the top priority of all uses under the Idaho law and Constitution, and the diversion is through domestic use and stockwatering, and also for the maintaining of subterranean water tables to supply water for domestic pumps in the area. This principal is emphasized in the recent Idaho Power Company case in the Supreme Court of the State of Idaho, which in effect limits the use of not only the surface waters of the Snake River, upon which the Idaho Power Company has water rights for hydrogeneration of power, but also limits the use of wells pumping from the subterranean acquifers, because those acquifers recharge the surface water supplies in the Snake River. In other words, there is a direct correlation and connection between surface and ground waters to satisfy existing decrees.

We have all filed our claims to our water rights, claiming priorities of January 1, 1880, and describing the source of our water

as Willow and Sand Creeks, as tributaries to the Snake River, for stockwatering purposes, in connection with the operation of our farms along Willow Creek, and in connection with our decreed irrigation water rights on the same creeks. Notice of those water rights have been published, pursuant to Idaho law, by the Department of Water Administration of the State, and no objections or counter-affidavits or contrary evidence have been filed or deposited with the Department of Water Administration of the State of Idaho.

In the construction of the outlet to Ririe Dam and Reservoir, the old natural channels of Willow Creek have been somewhat altered, resulting in moving those channels, in some instances, from their original locations. Case law in Idaho has clearly shown that the removal of a stream or natural channel from the landowners who settled or lived next to that stream was a taking in violation of the property rights of that individual in having the stream and channel in its natural location. Other court decisions support the proposition that if a person transfers his right out of a stream, he has to leave enough in the channel to support the conveyance needs of others. In other words, water users are not only entitled to the specific water used (in this case, for domestic uses, stockwatering, winter irrigation, maintaining of the subterranean water levels), but also they are entitled to the benefits of the entire flow of Willow Creek as a means of conveying their water rights to their respective ranches and places of use, and to have it available whenever it was needed, consistent with their historical uses thereof.

Being deprived of winter uses of the waters of Willow Creek has devalued all of our farms, which provided the incentive for the early settlers to select these lands over other lands in the area, and which have since been deemed the prime locations in the area until recently when the Government made the decision to shut off all water in Willow Creek, a natural stream and channel, throughout the winter months.

All of us, in general, had received assurances in the planning stages of the dam and reservoir that we would not be deprived of our water, and some of us had been specifically promised that we wouldn't have to drill a well because the water would be available to us the year round, even thougn the dam and reservoir were being constructed. We relied upon those assurances and were lulled into a false sense of security. Had we known the Government would deny us the use of those water rights, we would have made the appropriate objections and taken whatever actions were necessary to have prevented the situation as it now exists.

We believe that the Government should honor its commitments. We believe that our winter water rights are property rights and have been taken without due process of law and without just compensation. We believe that the bad situation, as it now exists, came about as a result of bureaucratic mishandling of the situation and particularly the manner of eliciting support of the farmers in the area affected by the construction of the dam and reservoir and the subsequent negotiations between the representatives of the Government and the farmers affected in the area.

Our rights are valuable to us, they have been taken from us by the Government without payment, contrary to the promises and representations made to us, and this bill and resolution is an attempt to rectify that situation to some degree. It will never provide us recompense for the losses that we have sustained, and will sustain, but at least it is a means of some restitution. We sincerely solicit your support of the bill and resolution.

DATED This ____ day of July, 1983.

	Name	Address	Telephone
Chairman of Chairman	Jessie Jackson	RT 8 Box 153 I. Falls	523-731
	[illegible]	RT. 8 Box 755 Idaho Falls Ida	522-6780
	Gary L. Holt	RT. 8 Box 60 Idaho Falls Ida	522-8838
	W. O. Kyle	RT 8 Box 38 Idaho Falls Ida	522-5627
	Jack L. Wilson	RT 8 Box 105 I.F. Ida	538-9303
	Kenneth Olsen	RT 8 Box 150 Idaho Falls Ida	523-0970

Signed by Action Committee for Wilson Trust Water Users

September 28, 1983

Senator James A. McClure:

We would like to submit some additional information and testimony regarding our Willow Creek legislation, S.483.

We would like this to be included: That our damage claims, notarized depositions, photographs and pertinent information regarding these claims, were all researched, verified and turned in to the Bureau of Reclamation at their request previously.

Ferrin Jenkins, Chairman
Willow Creek Waters Users Group

Senator NICKLES. I think it's very appropriate and quite possibly it will answer some of the questions that I have just raised.

The CHAIRMAN. They make one allegation in their statement which perhaps would reflect something upon the justification of their claim. Their statement indicates that Willow Creek and a tributary, Sand Creek, in those areas were both fed by springs. The spring water was slightly warmer than the natural water course. And because of the nature of those springs, the water of course has remained open. It was only following the building of the dam that changed both Willow Creek and the source of the water, that the icing became the problem that it has since become.

Is that correct?

Mr. DUNN. Mr. Chairman, Senator McClure, yes it is. I think it should be clear there has been an icing problem and that was the cause of some of the flooding, but the warm water did allow an event to occur which would essentially bridge the channel with ice and keep an area open so that all they had to do was open that spot up in the channel and there would be water available to them. And that's what they thought would continue in the downstream area.

The CHAIRMAN. I think it ought to be noted for the record too that this is in southeastern Idaho and the elevations are high, the winter temperatures are very low, and icing is a common problem in that area. The freezeup of the small streams is not uncommon at all. But with a source of water that would keep this channel open, it does have a rather unique characteristic in this particular area. They alleged in their statement that this phenomenon, this factor of having a water supply that was free flowing all winter was rather unique in the area and was reflected in land values and in the desirability of those lands for stock, livestock operation, because the water would be available, was available year round, which was not always the case in all of the small tributaries.

Senator NICKLES. Could the Senator inform this Senator what caused the shutdown of the warm stream?

The CHAIRMAN. The dam. The water now comes from the reservoir in which that is all comingled and it's cold water that would be released from the dam. You no longer have the same source of water at the same temperature.

Senator NICKLES. That was not anticipated by the corps?

The CHAIRMAN. No; it was not. They also represent in their statement, it's a self-serving declaration certainly but they alleged in their statement that there was a general understanding in conversation with the Corps of Engineers prior to construction of the dam that stock-watering water would be available throughout the year and that those uses would not be interferred with. I think part of the problem may have arisen because of the change of administration of the project. It was built by the corps and then turned over to the Bureau, and I think there was a substantial disconnect between the understanding of one agency as to what the other had intended to do.

Senator NICKLES. One final question, I'm wondering where this $300,000 comes in?

The CHAIRMAN. It's an umbrella figure. My own recollection is it was derived from the estimates that were made at one time, I believe by the Bureau, as to what it would cost them to drill out a stock-watering well for each of the ranchers and substitute a supply of water by the Government, directing an investment in a well for each of them.

Senator NICKLES. I appreciate the Senator's comments and I appreciate your comments. Mr. Dunn.

We're also very pleased to have Senator Evans join us this morning, and I would hope as a permanent member of this committee. Your input and suggestions on this legislation or other legislation, would be appreciated. Did you have any comments on this particular bill?

The CHAIRMAN. Might I just join you in welcoming Senator Evans in his first participation in this committee. The Republican conference has already voted to make him a member of this committee as one of his assignments which was his request because of the interest the State of Washington has in energy and natural resource issues. While that has not yet been ratified by action taken in the Democratic caucus, I hope simply because they have not yet met on that subject, he is more than welcome to appear here and particularly since there is a Washington matter on the agenda this morning about which he knows a great deal and has a great deal of interest. It's a particular pleasure to welcome the newest Member of the U.S. Senate this morning.

Senator EVANS. Thank you, Mr. Chairman.

Senator NICKLES. Did you have any questions on this particular bill?

Senator EVANS. No.

Senator NICKLES. Mr. Dunn, thank you very much for your input. Mr. Broadbent, you don't need to leave, you're up next.

Our next bill will be S. 1027. S. 1027 amends Public Law 96-162 which authorize the feasibility investigation of the Yakima River basin water enhancement project in Washington, and we are cer-

tainly pleased to have Senator Evans join us today and have his expertise on this legislation. We have several panelists. If they would come forward now it would be appreciated.

They are John Spencer, deputy director, Washington State Department of Ecology; Jim Waldo, coordinator, Northwest Water Resources Committee; Keith Colbo, Northwest Power Planning Council; Mel Sampson, chairman, Yakima Tribal Council Legislative Committee.

Any opening comments by Senator Evans?

Senator EVANS. No.

Senator NICKLES. Mr. Broadbent, would you care to proceed?

STATEMENT OF HON. ROBERT N. BROADBENT, COMMISSIONER, BUREAU OF RECLAMATION, DEPARTMENT OF THE INTERIOR, ON S. 1027

Commissioner BROADBENT. Mr. Chairman and members of the committee, I'm happy to be here today to represent the administration's position on S. 1027. I've had the opportunity on several occasions to be in the Yakima River basin and to look at the study that we're doing on the Yakima River basin enhancement project, and I see the need for the continued study and the benefits that can be gained from this bill.

We in the administration are happy to be able to support the bill. The bill provides that if the State of Washington advances the money for reregulating reservoirs, that money that they do advance would be credited toward cost sharing if a later project is authorized and appropriated. The reregulating reservoir and fish passage works, I feel, are necessary elements of a resolution of the problems in the Yakima basin. We would be very happy to work with all of the interested parties.

We have some suggestions that are more for clarification than modifications, to make sure that the Government is protected in its appropriations as we get further on and if there is an authorized project.

[The prepared statement on S. 1027 of Commissioner Broadbent follows:]

Statement of Robert N. Broadbent, Commissioner
Bureau of Reclamation
Representing the Department of the Interior
before the Senate Committee on
Energy and Natural Resources
Subcommittee on Water and Power,
on S. 1027,
a Bill to Amend Public Law 96-162
for Certain Construction Costs
Associated with the Yakima River Basin
Water Enhancement Project

September 15, 1983

Mr. Chairman and members of the Subcommittee. I am appearing today to present the views of the Department of the Interior on S. 1027.

S. 1027, if enacted, will give the State of Washington credit for any costs it incurs in constructing features of the Yakima River Basin Water Enhancement Project prior to construction authorization and the appropriation of funds by the Congress for the project.

A joint Federal-State feasibility study of the Yakima River Basin Water Enhancement Project was authorized by the Congress in 1980 and is presently underway. Phase I of the study was completed in August 1982 and identified some potential elements that could be considered for early implementation while the detailed feasibility study of the project is proceeding. The feasibility study is scheduled to be completed in fiscal year 1986.

We support the concept presented in S. 1027 but recommend certain amendments to the bill. We also support proceeding with construction of early action items such as the East Selah Reregulation Reservoir and fish passage protective measures which can help now to alleviate some of the basin's water resource and anadromous fishery problems. If the State of Washington is willing to fund such

early implementation items, we feel it is entirely appropriate to credit such expenditures toward future cost-sharing on the overall Yakima River Basin Water Enhancement Project.

In order to receive credit for costs or contributions borne by the State, Section 2 of the bill would require the State to obtain approval from the Commissioner of Reclamation to construct any specific project features. Such a requirement would usurp the authority normally reserved for the Secretary of the Interior acting with the concurrence of the President and the Office of Management and Budget. Therefore, we suggest that the legislation require approval of specific project features by the Secretary of the Interior rather than the Commissioner of Reclamation before the State or other entity begin construction.

We would also like to mention that legislation recently enacted by the State of Washington and signed by Governor Spellman provides authority for the State to fund the construction of the East Selah Reregulating Reservoir as an early implementation item. It is proposed by the State legislation that upon completion, the facility be transferred to the Bureau of Reclamation for operation and maintenance as part of the Federal Yakima Project. S. 1027 does not provide authority for the Bureau of Reclamation to assume operation and maintenance responsibility of any such features constructed early by the State or other entities, nor do we see a need for such authority at this time.

I would note, however, that we are actively engaged in discussions with Bonneville Power Administration and the Northwest Power Planning Council on future measures to address anadromous fishery problems.

We also believe the bill should be amended to make it clear that it does not

require reimbursement by the Federal Government of costs incurred by the State of Washington in excess of their share of costs for construction of project features, nor does it commit the Federal Government to authorization, construction or any future financial participation in the project.

Amendments to implement these specific suggestions will be provided for the record.

Mr. Chairman, this completes my statement. I would be happy to answer any questions you may have.

Senator NICKLES. Thank you.

The next panelist, Mr. Spencer, deputy director, Washington State Department of Ecology.

STATEMENT OF JOHN F. SPENCER, DEPUTY DIRECTOR, WASHINGTON STATE DEPARTMENT OF ECOLOGY, ON BEHALF OF GOV. JOHN SPELLMAN, STATE OF WASHINGTON

Mr. SPENCER. Thank you. It's a real pleasure to be here this morning to speak to the bill, and it's a pleasure to be able to speak to our new Senator, Mr. Evans.

S. 1027 relates to a credit to the State of Washington for construction of a reregulating reservoir on the Yakima River at Selah, Wash. In this regard, I would like to offer some background in support of this bill and note where some additions are needed to fully meet the needs of the State.

The Yakima River basin is located in central Washington State, draining an area running southeasterly from the Cascade Mountains to the Columbia River. It is one of the oldest irrigated valleys in the State, with over 500,000 acres of irrigated land, served by 6 major reservoirs managed by the U.S. Bureau of Reclamation.

Early records in the valley indicate an abundance of salmon and steelhead in the river, with runs of spawning salmon and steelhead as high as 500,000 adults. Today, it is estimated that the runs number no more than 5,000 adults.

In 1977, forecasters brought forth dire predictions of water availability. Proposed allocation of water to low priority areas stimulated the filing of numerous law suits, including major claims for the Yakima Indian Nation lands and for fisheries needs. Many of these claims are now pending in a general adjudication of water in State court.

Recognizing the need to solve the water shortage problems of the Yakima, Congress authorized the Yakima River basin water enhancement study in 1980. This study, financed in part by a $500,000 grant from the State, enabled the Bureau of Reclamation to study structural and nonstructural ways to improve water management in the basin. Particularly to solve the conflicts between

serving existing land, new land on the Yakima Indian Nation Reservation, and fishery needs.

At the completion of the first phase of the enhancement study, 35 reservoir sites were narrowed to 11 sites for further study. In addition, early construction of a reregulating reservoir and fish passage improvements were recommended. The reregulating reservoir was identified for early construction, since it will improve current operations and improve operations with any future added storage.

The State of Washington has appropriated $14 million to do advance design and construct the reregulating reservoir. However, this appropriation is contingent upon being able to secure a credit of such funding toward any future costs the State may be required to bear in the event Congress authorizes a major enhancement project. The State is not asking for a promise to authorize an enhancement project and realizes that any future share of costs to be carried by the State for enhancement will be determined by Congress. I would like to also add that the Yakima Indian Nation has been closely involved in the Yakima enhancement project and should receive the same recognition of credit as the State.

If constructed, the reregulating reservoir would be integrated with the Bureau of Reclamation's Yakima project operations. The reservoir is a small, 239 surface-acre facility, designed to aid in the regulation of river flow as water is released from storage. Thus, it can reduce the unnecessary peaking of flows in the river and improve the carryover of water from year to year. Similarly, it can aid in maintaining base flows in the river.

It is the State's intent to release the reservoir to the Bureau of Reclamation for operation as part of the overall Yakima project. This proposed legislation should be amended to explicitly enable the Bureau to take title to, operate and properly assess for the annual operation and maintenance expenses of this facility or any fish passage facilities which may be constructed. The reregulating reservoir and/or any fish passage facilities constructed under this proposed act should be integrated financially with other works of the Yakima project.

Fish passage improvements have long been recognized as inadequate in the Yakima. It is disturbing that such facilities have either not been installed, inadequately maintained, or not upgraded where they have failed to operate adequately. The Bureau of Reclamation identified those facilities needed to improve fish passage in its Bumping Lake report several years ago. More recently, the Northwest Power Planning Council identified such facility needs in its fish and wildlife plan. Now the lists have been combined, representing a need for about $23 million in fish passage improvements.

Efforts to improve fish passage should be taken at the earliest possible time. Such facilities do not conflict with other uses of the river in any significant way. Even with these improvements, it will take many years before the fish population returns naturally to any reasonable portion of past populations. To prevent the demise of important salmon and steelhead stock, these improvements should get underway soon.

We support legislation prepared by the Northwest Power Planning Council to enable the Secretary of the Interior and the Secretary of Energy through BPA to cooperate in funding and constructing fish passage facilities. We would hope that both the reregulating reservoir funding credit for the State and legislation for fish passage facility improvements can be enacted.

I would be pleased to answer any questions you might have regarding this legislation. I have taken the liberty to attach to my statement proposed amendments to S. 1027 to give the Secretary of Interior authority to take title to the reregulating reservoir, and thereafter operate and maintain the facility.

[The attachments to the prepared statement of Mr. Spencer follow:]

ATTACHMENT 1

Proposed Amendments to S1027
(Deletions shown struck through)
(Additions shown underlined)

A BILL

To amend Public Law 96-192 to provide a credit to the State of Washington for certain construction costs associated with the Yakima River Basin water enhancement project.

Be it enacted by the Senate and the House of Representatives of the United States of America in Congress assembled, That Public Law 96-162 (relating to the Yakima River Basin water enhancement project feasibility study) (93 Stat. 1241) is amended by adding a new ~~section~~ sections at the end thereof:

"Sec. 2. If the State of Washington, prior to an authorization (or the providing of an appropriation of funds to the ~~Department of the Interior~~ Secretary of the Interior) to construct the Yakima River Basin water enhancement project, constructs any physical element of that project, including any reregulation dam or fish passage facility, the costs incurred by the State, in construction of such elements shall be credited to the total amount of any costs to be borne by the State, as contributions toward payment for the cost of the project; except that, no such credit shall be given to any element constructed by the State, unless the element was approved by the ~~Commissioner of the Bureau of Reclamation~~ Secretary of the Interior prior to its construction. The ~~Commissioner~~ Secretary shall grant such approval, when requested by the State of Washington, if it appears the element

proposed for construction is an integral part of the project. All approved elements constructed by the State, as provided in this section, shall be included as a part of the project previously directed for feasibility determination study by the first section of this Act.

Sec. 3. The Secretary of the Interior is authorized to negotiate and enter into agreements with the State of Washington, the Yakima Indian Nation or other entity for the State of Washington, the Yakima Indian Nation or other entity to finance construction of a reregulating reservoir or fish passage facilities; provided that construction not be initiated until the Secretary of the Interior has approved designs and plans for construction and operation which he determines to be for the purpose of improved stream conditions for anadromous and resident fish resources and improved operational control of water for the Yakima River Basin. The Secretary of the Interior is authorized to take title to the reregulating reservoir or fish passage facility upon its completion and thereafter to operate and maintain it.

Sec. 4. Any reregulating reservoir or fish passage facilities constructed under this act shall be integrated financially with other works of the Yakima project. The Secretary of the Interior shall negotiate and enter into agreements for the payment of operation and maintenance costs allocated to irrigation water supplies pursuant to provisions of the Act of August 4, 1939 (53 Stat. 1187). Operation and maintenance costs of the reregulating reservoir or fish passage facilities allocated to fish and wildlife shall be nonreimbursable and nonreturnable under the Federal Reclamation Laws."

28-181 O - 84 - 4

ATTACHMENT 2

AUG 29 1983

State of Washington

JOHN SPELLMAN, Governor

AUG 29 1983

OFFICE OF THE GOVERNOR

The Honorable Don Nickles
Chairman, Senate Subcommittee on
Water and Power
Committee on Energy and Natural Resources
Washington, D.C. 20510

Dear Senator Nickles:

Thank you for your August 2, 1983, letter advising that your Subcommittee on Water and Power will receive testimony on three bills on September 15, 1983, including S. 1027, which relates to water resource managment studies in the Yakima River Basin of Washington State.

I support the provisions of S. 1027, and I am pleased that your subcommittee will consider the bill. Mr. John F. Spencer, Deputy Director of the Washington State Department of Ecology, will present a statement of support and a discussion of our study activities under Public Law 96-162. He has been in contact with members of your staff concerning the testimony.

I appreciate your courtesy and interest in informing me of the September 15 hearing.

With best wishes,

Sincerely,

PERSONAL SIGNATURE

John Spellman
Governor

cc: John F. Spencer, Deputy Director
Washington State Department of Ecology

Legislative Building • Olympia, Washington 98504 • (206) 753-6780 • (Scan) 234-6780

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CHARLES A. TRABANDT, CHIEF COUNSEL
D. MICHAEL HARVEY, CHIEF COUNSEL FOR THE MINORITY

United States Senate

COMMITTEE ON
ENERGY AND NATURAL RESOURCES
WASHINGTON, D.C. 20510

August 2, 1983

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The Honorable John Spellman
Governor
State of Washington
Legislative Building
Olympia, Washington 98501

Dear Governor Spellman:

I am pleased to advise you that the Subcommittee on Water and Power of the Committee on Energy and Natural Resources has scheduled a hearing on three bills, one of which is S: 1027, to amend Public Law 96-162 (Yakima River Basin).

The hearing will be held on Thursday, September 15, beginning at 10:00 a.m. in Room SD-366 of the Dirksen Senate Office Building.

The Committee will be pleased to receive any testimony you may wish to present either in person at the hearing or in writing for inclusion in the printed transcript of the hearing. Local officials and citizens are also welcome to present their views at this time.

If you require any further information, please contact Russell R. Brown, Professional Staff Member, Subcommittee on Water and Power at (202) 224-2366.

Sincerely,

Don Nickles
Chairman
Subcommittee on Water
and Power

DN:dlm

ATTACHMENT 3

IN THE LEGISLATURE
of the
STATE OF WASHINGTON

CERTIFICATION OF ENROLLED ENACTMENT

HOUSE BILL NO. 595

CHAPTER NO. .....

Passed the House April 26, 1983

Yeas 96 Nays 0

Passed the Senate May 5, 1983

Yeas 37 Nays 10

CERTIFICATE

I, Dean R. Foster, Chief Clerk of the House of Representatives of the State of Washington, do hereby certify that the attached is enrolled House Bill No. 595 as passed by the House of Representatives and the Senate on the dates hereon set forth.

DEAN R. FOSTER, Chief Clerk

HOUSE BILL NO. 595

State of Washington 48th Legislature 1983 Regular Session

by Representatives Ellis, Lewis, Dickie, Clayton, Smith, Chandler, Kaiser and Grimm

Read first time February 16, 1983 and referred to Committee on Agriculture.

AN ACT Relating to the Yakima river system; adding a new section to chapter 43.21A RCW; and making an appropriation.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF WASHINGTON:

NEW SECTION. Sec. 1. There is added to chapter 43.21A RCW a new section to read as follows:

(1) The legislature recognizes the need to improve the control and regulation of the waters of the Yakima river system to insure that both necessary diversionary and instream beneficial uses of those waters, which provide the foundation for the economic and environmental well-being of the Yakima valley, are achieved to the maximum extent reasonably attainable. It is further recognized that the most satisfactory means for satisfying this need is to improve the existing water project, known as the Yakima project, presently operated by the United States bureau of reclamation. Therefore, the legislature intends to aid the United States in improving the Yakima project by constructing physical works and providing financial assistance.

(2) For the purpose of implementing subsection (1) of this section, the department of ecology may acquire, design, and construct a project, known as the East Selah reregulating reservoir, and may acquire, by gift, purchase, or condemnation, all real property interests necessary to complete the project. The department may then transfer the completed East Selah reregulating reservoir to the department of the interior of the United States subject to such conditions as the department of ecology requires to ensure that the objectives of this section are achieved.

(3) The department shall not:

(a) Exercise any powers of acquisition or construction provided in subsection (2) of this section, until the department has entered

Sec. 1

into a binding agreement with the United States department of the interior that the department of the interior will, upon completion by the department of the East Selah reregulating reservoir project, accept title to the project and thereafter operate and maintain the project (i) consistent with the agreement of transfer, and (ii) without any obligation upon the state for payment of costs for the operation or maintenance of the project; or

(b) Enter into any agreement under subsection (3)(a) of this section until (i) federal legislation is enacted recognizing the amount of the value of the completed East Selah reregulating reservoir as a credit to any matching funds requirement placed upon the state of Washington established in any authorization or appropriation bill enacted after the effective date of this act relating to any project studied under Public Law 96-162, and (ii) the department is satisfied that the United States has the necessary water rights to operate the project.

NEW SECTION. Sec. 2. There is hereby appropriated from the state and local improvement revolving account--water supply facilities (Referendum 38) of the general fund to the department of ecology for the biennium ending June 30, 1985, the amount of fourteen million five hundred thousand dollars to carry out the purposes of this act.

Passed the House April 26, 1983.

Speaker of the House.

Passed the Senate May 5, 1983.

John A. Cherberg
President of the Senate

Senator NICKLES. Thank you.
Mr. Colbo.

STATEMENT OF KEITH COLBO, NORTHWEST POWER PLANNING COUNCIL

Mr. COLBO. Mr. Chairman, members of the committee, it's a pleasure to appear on behalf of the Northwest Power Planning Council regarding S. 1027.

I'm a council member from the State of Montana and chairman of the Fish and Wildlife Committee.

In an effort to be brief I'm going to summarize the written statement that I submitted to the committee.

As background, first of all, as members of the committee know, the council was established by the Northwest Power Act, acted on by this committee, and enacted in law in 1980. The council is composed of two members appointed by the Governors from each of the four northwest States; Idaho, Montana, Oregon, and Washington. The council is required to develop a 20-year energy plan for the Pacific Northwest and develop a fish and wildlife program to protect, mitigate, and enhance fish and wildlife in the Columbia River Basin and its tributaries. Both the plan and the fish and wildlife program have been adopted by the council and the council is now carefully monitoring the implementation. This is the reason I'm here today.

I'm here to support the reregulation dam legislation and speak in support of an amendment to this bill which would insure the authorization and the implementation of specific fish passage facilities in the Yakima River basin which are called for in the fish and wildlife program.

The testimony of Mr. Spencer describes the merits of the reregulation facility except to say that the council refers to the need for the facility in its program and supports the legislation as a means to insure its actual construction.

The other matter for which I would like to urge this committee's consideration, in the context of this legislation is language which would clearly authorize the transfer of funds from Bonneville, the Bureau of Reclamation, to design, construct, operate, and maintain fish passage facilities in the Yakima River basin. The need for these fish passage facilities has long been recognized and the potential benefits in the Yakima River basin are substantial.

Specifically the proposed draft legislation which was included in the submitted testimony along with accompanying background report would do the following:

First, it would authorize the Secretary of the Interior through the Bureau of Reclamation to accept on fiscal year 1984 and thereafter to implement the passage measures at federal and nonfederal projects throughout the Yakima basin.

It would authorize Bonneville to transfer funds to the Secretary of Interior in fiscal year 1984 and thereafter, through the Bureau of Reclamation, to aid implementation of the passage measures.

It would authorize appropriations, subject to appropriation acts, in fiscal year 1985 and thereafter to assist in the funding of these measures.

It would provide Bonneville and the ratepayers with credit against their repayment obligation to the Federal Treasury if they overcompensate for hydropower-related fish and wildlife losses due to the Bonneville expenditures in the Yakima basin.

Finally, it would provide the State of Washington and other contributors funding these measures credit for their expenditures against any future obligations to share in the cost of the proposed Yakima River basin enhancement project which currently is being conducted under the feasibility study authorized under Public Law 96-162.

It should be pointed out this legislation will not in anyway effect existing water rights or claims in the Yakima River basin. It should be pointed out that the total cost of these facilities is estimated to be approximately $23 million, with the design and construction to be scheduled over a 4-year period commencing in fiscal year 1984. And those estimates and time schedules are provided in the background report I've submitted.

Finally, I would like the committee to be aware that this proposed draft legislation for the fish pasasge facility has been the product of numerous consultations, meetings with the interested parties in the Yakima River basin, including irrigation district representatives, fish and wildlife agencies, the Yakima Indian Nation, the Washington Department of Ecology, Bureau of Reclamation, and the Bonneville Power Administration. The drafting committee composed of representatives from these groups has been meeting for the past 6 months to develop this legislation.

The council has made some minor changes in that draft after hearing additional comments in a meeting in Yakima and this revised draft has recently been circulated to all parties for their review.

We will keep in touch with the committee and let the committee know of any changes which may be necessary as a result of our future consultations.

On behalf of the council I'd like to thank you, Mr. Chairman, for the opportunity to testify in support of legislation for the reregulation of the dam and the fish passage facilities. The council and its staff is available to assist you in any way and provide any additional background information which you believe is necessary.

Senator NICKLES. Thank you.

[The prepared statement of Mr. Colbo follows:]

STATEMENT BEFORE
THE SUBCOMMITTEE ON WATER AND POWER
OF THE COMMITTEE ON ENERGY AND NATURAL RESOURCES

UNITED STATES SENATE

Regarding S. 1027

NORTHWEST POWER PLANNING COUNCIL
PRESENTED BY KEITH COLBO, CHAIRMAN, FISH AND WILDLIFE COMMITTEE

Mr. Chairman, members of the Committee, it is a pleasure to appear on behalf of the Northwest Power Planning Council regarding S. 1027.

As you know, the Northwest Power Planning Council under section 4(h) of the Northwest Power Act (P.L. 96-501) was charged with the responsibility of developing a program to protect, mitigate and enhance fish and wildlife of the Columbia River Basin and its tributaries. In addition, the Council also was charged with the responsibility of developing a 20-year energy plan for the four Pacific Northwest states. The Columbia River Basin Fish and Wildlife Program was adopted by the Council on November 15, 1982 (see Attachment I), and the Energy Plan was adopted on April 27, 1983.

Since the Fish and Wildlife Program was adopted, the Council has been monitoring carefully its implementation to see that the program measures are carried out effectively.

The Council supports the construction of a reregulation reservoir and fish passage facilities in the Yakima River Basin. The legislation before you is necessary to credit the State of Washington and/or the Yakima Indian Nation for any costs borne by them in the context of the Yakima River Basin Enhancement Project Feasibility Study established by P.L. 96-162, and to assign clear authority to the Bureau of Reclamation to operate and maintain this facility. This project would provide significant benefits in the basin to anadromous fish and agriculture by improving the effectiveness of existing storage to meet target fish flows with more regularity and to reduce the fluctuation for irrigation purposes. The Council endorses this reregulation project as a means to allow additional stored water to be used both for fish enhancement and agriculture. Also, the Council believes that this bill is an appropriate legislative vehicle for removing a potential impediment to the implementation of an important part of the Council's Fish and Wildlife Program.

Section 904(d) of the Council's program includes measures to improve fish passage facilities at several water projects in the Yakima River Basin (see Table 6). These projects would be funded by Bonneville under the concept of offsite mitigation as compensation for damage to fish runs caused by hydroelectric dams on the Columbia River. The Council believes that fish enhancement measures in the Yakima River Basin would provide more cost effective mitigation than in the mainstem Columbia River as it exists today. The Yakima River Basin contains extensive and valuable anadromous fish habitat which, with improvements to the fish passage facilities, could result in substantial increases in the number of returning adult salmon and steelhead to the Yakima River system.

Although there is extensive agreement among all parties concerned that these passage facilities are needed and that the potential benefits are very high, the implementation of these passage measures could be delayed because of the need for specific authorization for the Bureau of Reclamation to accept funds from Bonneville for the design, construction, operation and maintenance of these facilities. According to attorneys for both agencies and our counsel, the doctrine of "unauthorized augmentation of appropriations" would prohibit such a transfer, especially the acceptance of these funds by the Bureau of Reclamation without specific authorizing legislation.

Therefore, the Council is proposing that your Committee adopt a revised version of the reregulation dam legislation which also would include the authority to transfer funds from Bonneville to the Bureau of Reclamation for the design, construction, operation and maintenance of the fish passage facilities which are called for in the Council's Fish and Wildlife Program in the Yakima Basin.

At a consultation session in February of this year with the Bureau of Reclamation, Bonneville, and the Washington Department of Ecology, this authorization issue was first raised. Mr. John Spencer of the Washington Department of Ecology was designated by the Director of that department, Mr. Donald Moos, to work with all of the interested parties toward a unified position which could be forwarded to the Congress and provide any necessary authorization for the fish passage facilities. Numerous meetings were held with representatives of the fish and wildlife agencies, the Yakima Indian Nation, Bonneville, the Bureau of Reclamation, Washington Department of Ecology, the Pacific Northwest Utilities Conference Committee, the irrigation districts, the Council, and others. As a result of these meetings, the Council reviewed and commented on several draft versions of legislation which would authorize the transfer of funds for the fish passage facilities. At a meeting on August 9-10 in Yakima the Council heard comments on a proposed draft. This proposed draft has been modified to reflect various concerns expressed at that meeting and has just recently been circulated to the above parties for review. The Council expects to consult further with each of these parties.

I am including as part of my testimony a copy of this revised draft and an accompanying background report which was developed by the drafting committee and revised by the Council to reflect comments from its August Yakima meeting (see Attachments II and III). In the next two weeks the Council will be discussing the specific language of this revised draft to determine whether any further changes are necessary, and we will convey the results of these discussions to the Committee.

The draft which we are providing to the Committee would do the following:

(1) Authorize the Secretary of the Interior (through the Bureau of Reclamation) to accept funds in FY 1984 and thereafter to implement the passage measures at federal and nonfederal projects throughout the Yakima Basin;

(2) Authorize Bonneville to transfer funds to the Secretary of the Interior in FY 1984 and thereafter (Bureau of Reclamation) to aid implementation of the passage measures;

(3) Authorize appropriations, subject to appropriation acts, in FY 1985 and thereafter to assist in the funding of the measures;

(4) Provide Bonneville and the ratepayers with credit against their repayment obligation to the Federal Treasury if they "over-compensate" for hydropower-related fish and wildlife losses due to the Bonneville expenditures in the Yakima Basin; and

(5) Provide the State of Washington and other contributors funding these measures credit for their expenditures against any future obligations to share in the cost of the proposed Yakima River Basin Enhancement Project which currently is being conducted under the Feasibility Study authorized under P.L. 96-162.

This draft is a product of countless hours of consultation and discussion among the affected parties in the Yakima Basin. It would accomplish the objective of authorizing funding for the design work for the higher priority fish passage facilities in FY 1984 with future cost sharing between the region's ratepayers and the Federal government to be developed in the context of the FY 1985 appropriations process.

The Council believes that this is a sound and defensible approach which would ensure the timely implementation of Section 904(d) of the Council's Fish and Wildlfie Program. This program was based on a rigorous public review process with extensive hearings, consultations, and formal comment periods on the original fish and wildlife recommendations and on the draft program.

There has been extensive support for the Council's program, including Section 904(d), throughout the region and for the general concept of offsite mitigation for mainstem losses of anadromous fish habitat due to hydroelectric system development. Under a provision of the Northest Power Act which calls on expedited judicial review of the Council's program within 60 days of adoption, there were no appeals to the Ninth Circuit Court of Appeals. The Council believes that this alone provides significant evidence of the widespread support for the Council's program, given the history of disputes and litigation between the so-called "fish and power interests" of the Columbia River Basin. Under Section 4(h)(5) of the Northwest Power Act the Council was required to develop a program "to protect, mitigate and enhance fish and wildlife in the Columbia River Basin and its tributaries while maintaining an adequate, economic and reliable power supply. The Yakima Basin fish passage facilities are a fundamental part of this program, and the passage of this proposed legislation would remove a major impediment to their implementation.

In addition, Mr. Chairman, it should be pointed out that one of the by-products of these discussions is that there is a new spirit of cooperation in the Yakima River Basin among the irrigation districts, the Yakima Indian Nation and the state and federal agencies with resource management responsibilities in the basin. Because of this cooperation surrounding the development of the legislation, I believe it is especially important that this legislation be considered by your Committee and acted upon in order to maintain the momentum which has been started toward greater cooperation in the future among the water users of the basin. Without passage of this legislation, Bonneville will be unable to fund the construction of the fish passage facilities in the Yakima Basin, and it is uncertain whether Bonneville will be willing to fund the necessary design work in FY 1984. Therefore, the Council urges the Committee to amend the legislation for the reregulation dam, because it is most likely the the most expeditious means of ensuring the funding of the necessary design work in FY 1984. Also, the Council believes that S. 1027 is an appropriate vehicle because it is similar in purpose, it

affects the same specific area and very similar interests, and the reregulation facility is also a strongly supported element of the Council's program.

Mr. Chairman, I appreciate the opportunity to testify on this legislation on behalf of the Council. We will defer to you and your staff regarding the most expeditious legislative procedure, although we offer our services and whatever efforts may be required to merge the reregulation facility legislation and the proposed fish passage facilities amendment. Also, we will continue to work with the Honorable Sid Morrison of the other body to fashion legislation which will achieve an equal balance between fish and wildlife and agricultural benefits and ratepayer responsibilities. This legislation offers a significant opportunity to demonstrate the cooperation of fish and wildlife agencies, tribes, irrigation districts, and state and federal agencies with resource management responsibilities in the Yakima Basin. It also offers a significant opportunity to improve anadromous fish runs in the Columbia River Basin which is a primary objective of the Council's Fish and Wildlife Program.

-4-

STATEMENT OF MELVIN SAMPSON, CHAIRMAN, YAKIMA TRIBAL COUNCIL LEGISLATIVE COMMITTEE, ACCOMPANIED BY TIM WEAVER, COUNSEL

Mr. SAMPSON. Thank you. I have accompanying me Mr. Tim Weaver.

We have a prepared statement here and I would like to cite from it.

Mr. Chairman, my name is Melvin Sampson. I am an elected member of the Tribal Council of the Confederated Tribes and Bands of the Yakima Indian Nation and the chairman of its legislative committee. The Yakima Indian Nation appreciates the opportunity to testify today on S. 1027.

The Yakima River basin is totally within the 11 million acre area ceded by the Yakima Indian Nation to the United States by the Yakima Treaty of 1855. In return for that cession, the United States received the beneficial use of its water to the Yakima people for both irrigation and fishery uses. At treaty times the Yakima basin supported salmon runs estimated at 500,000 to 600,000 adult salmon per year. The abundant runs supplied subsistence for the Yakima people, both where the Yakima River forms the reservation boundary for approximately 30 miles and throughout the entire 170 mile length of the Yakima River. Pre-1900 harvests numbered in the tens of thousands of all species. In 1983 the 7,000 members of the Yakima Indian Nation harvested only 83 Yakima River salmon.

Beginning shortly before the turn of the century irrigation development began to impact these runs. In 1905 the Federal Government began the Yakima basin irrigation project. Federally funded irrigation storage dams and water withdrawals have reduced Yakima basin salmon runs to approximately 2,000 to 3,000 adults yearly. Summer chinook and sockeye are now extinct in the basin due to irrigation practices. The remaining runs have been reduced to remnants due to inadequate passage at private and federally

owned irrigation dams, and inadequate instream flows from federally controlled storage reservoirs. At times there is not only insufficient water for fish passage, but also insufficient instream flows to protect the eggs deposited by the small numbers of fish that now reach the spawning grounds. Unfortunately, many times the situation could be recitified by only inches of additional water. The Yakima Indian Nation is dedicated to taking the measures necessary to insure that these flows are provided.

In spite of these problems the Upper Yakima basin still contains over 100 miles of the best natural salmon spawning habitat in the world. The Yakima Nation, through Federal court action in 1980, obtained an order requiring the Bureau of Reclamation to modify its water operation to protect fish spawning in these areas. This has improved spawning survival to a substantial degree within the confines of the court decision. Further improvements are required to fully utilize all available habitat. However, conditions are now available for increases which can be created by improved passage at downstream dams. Protection of spawners is the first step in rehabilitating Yakima River runs. Fish passage over Federal irrigation dams, particularly the Sunnyside Dam facility, is the second crucial step in Yakima rehabilitation.

While all Yakima River irrigation diversion dams are desperately in need of rehabilitation to insure adequate fish passage, sufficient flow at the Sunnyside facility is generally the most critical factor. Increase in overall basin storage is probably the most feasible answer to insure protection of all competing water uses, but additional large scale storage projects are a few years away.

The ability to manage fish passage flows at Sunnyside and still provide for irrigation management appears to be a readily available start at solving these problems. Accordingly the Yakima Indian Nation supports the concept of the Selah Reregulating Reservoir as a first step toward resolution of Yakima passage problems. The facility would be used to divert small quantities of water during periods of abundance, that is, the spring freshet or other times when downstream flows are sufficient for fish passage and irrigation needs. The stored water would then be released during more critical periods to assure maintenance of fishery and irrigation flows.

The Yakima Indian Nation stands in a unique position in the Yakima basin. It has treaty secured rights to both maintenance of its fishery resource and also is the largest irrigation diverter in the system. No other party to this legislation shares on joint rights and concerns. The Yakima Indian Nation believes that fishery and irrigation uses are compatible, and has dedicated its efforts to solve both problems. Wise water management for protection of fishery resources is the key to preserving runs at the present time. However, it is our position that S. 1027 needs significant revision to accomplish its intended purposes.

S. 1027 as before you today appears to be identical to the bill originally introduced in the House as H.R. 653. A substitute bill has passed out of the House subcommittee with substantial amendments. A copy of H. 653 with our proposed amendments is attached to our testimony for your use.

The Yakima Nation believes that S. 1027 should be amended to include the following concepts:

One. The credit provision should be extended to include any expenditures made by the Yakima Indian Nation.

Two. That the bill clearly indicate that it deals with the presently ongoing Yakima River Basin water enhancement study and project.

Three. That the bill require that prior to approval of any project by the Secretary of the Interior that the concurrence of the Yakima Indian Nation be obtained.

Four. That the language of the bill specifically State that no Yakima River basin water enhancement project shall be approved unless it is determined that it will provide protection for the enhancement and migration of the fishery resource of the Yakima Basin.

Five. That any portion of the Yakima River basin water enhancement project constructed by the State of Washington pursuant to this act shall remain as a portion of the Federal Yakima irrigation project and shall be operated in accordance with Indian treaty rights, and the enhancement and migration of the fishery resource.

Six. That nothing in this act is intended to effect or in any way alter the treaty secured rights of the Yakima Indian Nation.

A second issue is the proposed amendment to this bill to include authority for the Bonneville Power Administration to transfer funds to the Bureau of Reclamation for construction of a portion of Yakima River fishery improvements. Section 6(a) of that act includes authorization and appropriation language for the Department of the Interior and Bureau of Reclamation. This language is intended to allow the Bureau of Reclamation to seek congressional funding for portions of the Yakima rehabilitation.

The Yakima Indian Nation believes that Congress already provided the funding transfer authority to Bonneville Power Administration under the Pacific Northwest Power Planning and Conservation act of 1980—Public Law 96–501. That act also clearly authorizes the Bonneville Power Administration itself to complete these functions. Only policy decisions made by the BPA Administration are preventing full funding from occurring. However, both the Bonneville Power Administration and the Bureau of Reclamation are finding the transfer authority to be a stumbling block to begin funding of the Bonneville Power Administration's obligation in the Yakima basin. Accordingly, in order to facilitate the flow of funds from the Bonneville Power Administration, the Yakima Indian Nation supports the language of the proposed amendment through section 5.

We oppose the remainder of the amendment from section 6(a) on, on the basis that Congress clearly directed that the Bonneville Power Administration had funding authority and the duty to provide funding for the Yakima River portion of the Columbia River Basin fish and wildlife program adopted by the Northwest Power Planning Council. We do not believe that Congress, in enacting Public Law 96–501, contemplated that the Bonneville Power Administration could refuse funding of program projects and demand that other agencies seek congressional funding to complete projects determined by the Northwest Power Planning Council to be the obligation of the Bonneville Power Administration.

The Yakima project represents a total Bonneville Power Administration expenditure of $23 million out of the total of $600 million to $700 million found to be its total Columbia basin obligation by the Northwest Power Planning Council.

Did Congress intend that the Bonneville Power Administration would require separate congressional appropriations to be granted to other agencies in each area of Bonneville' mitigative responsibilities? We think not. To condone that process will indefinitely delay and probably at least in part, frustrate the intent of Congress when it enacted Public Law 96–501. If an amendment is to be considered, the Yakima Indian Nation opposes the inclusion of any language beyond section 5 of the proposed amendment.

We appreciate the opportunity to present our view and you have our support of S. 1027. We're ready to answer any questions.

Thank you.

[The attachment to the prepared statement of Mr. Sampson follows:]

Proposed Amendment in the Nature of a Substitute for S. 1027 *

Strike all after the enacting clause and insert the following:

"That Public Law 96-162 (relating to the Yakima River Basin water enhancement project feasibility study) (93 Stat. 1241) is amended by adding the following new sections at the end thereof:

"Sec. 2. If the State of Washington or the Yakima Indian Nation, prior to an authorization (or the providing of an appropriation of funds to the Department of the Interior) to construct the Yakima River Basin water enhancement project, consutrcts any physical element of that project, including any reregulation dam or fish passage facility, the costs incurred by the State or the Yakima Indian Nation in construction of such elements shall be credited to the total amount of any costs to be borne by the State or, respectively, by the Yakima Indian Nation as contributions toward payment for the cost of the project; except that, no such credit shall be given to any element constructed by the State or the Yakima Indian Nation unless the element was approved by the Secretary of the Interior with the concurrence of the Yakima Indian Nation prior to its construction. The Secretary may grant such an approval, when requested by the State of Washington or the Yakima Indian Nation, if it appears the element proposed for construction is an integral part of the project, will provide protection for the enhancement an migration of the fishery resource of the Yakima River Basin, and will be operated in a manner consistent with treaty rights of the Yakima Indian Nation and the trust responsibility of the United States to the Yakima Indian Nation. All approved elements

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* includes amendments adopted by the House Interior Subcommittee on Water and Power Resources and further amendments proposed by the Yakima Indian Nation.

constructed by the State as provided in this section, shall be included as a part of the project previously directed for feasibility determination study by the first section of this Act."

"Sec. 3. The Secretary of the Interior is authorized to take title to the reregulating reservoir or fish passage facilities, or both, constructed by the State of Washington pursuant to Section 2 of this Act, without giving compensation therefor, and thereafter to operate and maintain such facilities. The operation and maintenance costs of any reregulating reservoir or fish passage facilities, or both, constructed under this Act shall be integrated financially with other works of the Yakima project. The Secretary of the Interior shall negotiate and enter into agreements for the payment of operation and maintenance costs allocated to irrigation pursuant to provisions of the Act of August 4, 1939 (53 Stat. 1187). Operation and maintenance costs of the reregulating reservoir or fish passage facilities, or both, allocated to fish and wildlife shall be paid for accordance with the Act of July 9, 1965 (79 Stat. 213)."

"Sec. 4. Nothing in this Act shall be construed to require reimbursement of costs incurred by the State of Washington or the Yakima Indian Nation for construction of project features or to provide a credit on projects other than those specified in Section 2, nor to commit the United States to project authorization, construction, or any future financial participation."

"Sec. 5. Nothing in this Act is intended to affect or in any way alter the treaty secured rights of the Yakima Indian Nation."

28-181 O - 84 - 5

Senator NICKLES. Thank you.

I have a couple of questions. How many reservoirs do we have in the Yakima project?

Mr. SPENCER. The Bureau operates six reservoirs in the Yakima and those six reservoirs provide about 1 million acre-feet of storage. The total demand for irrigation during the irrigation season is about 2 million acre-feet of water.

Senator NICKLES. How many users do you have in that?

Mr. SPENCER. Well there are about 550,000 acres of land irrigated. There are I think something like 62 different irrigation districts. There are about five major irrigation districts.

The population in terms of users I don't have.

Senator NICKLES. How far back do these projects go?

Mr. SPENCER. Well the original irrigation goes back to about the 1850's, but the peer project goes back to 1965.

Senator NICKLES. A lot of the comments break the issue down in to two segments. One was for the State credit, was it pretty well agreed to that that was a step in the right direction? Mr. Sampson you wanted to go a little bit further than that and also receive tribal credit for any moneys that were expended by the tribe?

Mr. SAMPSON. That's correct.

Senator NICKLES. What type of money are we talking about from the tribal standpoint?

Mr. SAMPSON. Well that's difficult to answer when you look at the total enhancement plan. Some of the projects are right on the reservation itself, and the overall plan as it will come out in the second phase, so we feel that in the event some time in the future that it became possible that the Yakima Indian Nation was able to contribute, we feel that we should get the credit as well, in the event the tribe did contribute some of their funds.

Senator NICKLES. Has the tribe contributed any to date?

Mr. SAMPSON. No.

Senator NICKLES. Mr. Spencer, how much has the State put in? You quoted two or three different figures.

Mr. SPENCER. We have put $500,000 into the enhancement study and that was an up front grant to the Bureau which they have nearly exhausted in the first phase of the study.

Senator NICKLES. Did the Bureau match that?

Mr. SPENCER. The Bureau has received additional appropriations and is continuing on with the study.

Senator NICKLES. Can you tell me how much the Bureau has?

Mr. SPENCER. About $2.5 million to $3 million. I think that's correct.

Commissioner BROADBENT. It's something over $2 million.

Senator NICKLES. The State put in one-half million dollars and the Bureau put in over $2 million.

Commissioner BROADBENT. And the State has also furnished some inkind services. They've had a number of their technical people working on the study as have people from the tribe and Northwest Power Planning Council and BPA. It's been a joint project in which there's been a lot of technical help from all outside interests as well as our own people.

Senator NICKLES. And you're seeking credit for your contribution. Is that only for your dollar contribution or inkind as well?

Mr. SPENCER. We're seeking the $500,000 and the inkind contribution. We're not really seeking any credit for that. That's money we've already put into the project, well spent. We're asking for credit for the advance design and construction of the reregulation reservoir. Our legislation and Governor Spellman has signed an appropriation of $14 million to construct the reregulation reservoir. We are proceeding now to select a consultant to do the design so we will have more information and can move on if this is approved.

Senator NICKLES. How large is the project?

Mr. SPENCER. It's a very small reservoir. It's really quite close to the town of Yakima. It will be using what is now existing gravel operation. It's about 239 surface.

There's two ways of describing it. One is it's kind of like a pressure tank on the water supply system so you have a constant pressure coming out of your system and you maintain a regular flow rather than peaks and valleys. Another has been described as when you go to water your petunia patch with a hose you go out to the petunia patch and you drop the hose and you run back to turn the faucet off. You've got so much water in the hose and it runs out and it's wasted water. So what this does, it puts a valve at the other end of the hose so you save the water. That's essentially how it operates and we end up saving 22,000 to 35,000 acre-feet of water every year.

Senator NICKLES. What size of a project dollar wise?

Mr. SPENCER. $14 million. We're going to pay for the whole thing, no reimbursement required from the users. We're not seeking any kind of reimbursement from the Government.

Let me also say, Mr. Chairman, with respect to all of the amendments that were recommended by the Yakima Indian Nation, we would support all of those that they have suggested except for the one where they have asked for approval authority over the reregulating reservoir. We feel the Secretary of the Interior will exercise that responsibility.

The CHAIRMAN. Did I understand you, Mr. Spencer, to say the State was not seeking reimbursement for the $14 million?

Mr. SPENCER. No we're not. We're asking if and when the major enhancement study authorizes construction of any future reservoirs, that if there is a cost sharing requirement upon the State, that that $14 million would be a credit against that.

The CHAIRMAN. Against the cost share, but only in the event the cost share is required?

Mr. SPENCER. Only in the event.

Senator NICKLES. Are there additional reservoirs contemplated in the future?

Commissioner BROADBENT. A study has shown that either additional reservoirs or additions to present reservoirs are needed. However, the study isn't completed. It will not be completed until 1986. The first phase indicated that the reregulating reservoir and the fish passage were necessary under any plan that might be adopted.

Senator NICKLES. Is it contemplated that additional reservoirs will be forth coming?

Mr. SPENCER. Yes it is. It is contemplated that additional reservoirs would be needed. There are some fairly significant steps that have to be taken yet to determine the feasibility.

Senator NICKLES. In this initial reservoir that you're talking about, the $14 million project, the State is moving ahead and it's going to finance and build that project without Federal assistance?

Mr. SPENCER. That is correct. And it is needed now to make the current system work better.

Senator NICKLES. Is that built by the State or by the Bureau?

Mr. SPENCER. Built by the State.

Senator NICKLES. The project that would supplement or implement the fish passage which Mr. Colbo and Mr. Sampson discussed at length, the $22 million project?

Mr. COLBO. Total, yes.

Senator NICKLES. That was to be financed primarily by the power users of Bonneville?

Mr. COLBO. Yes.

Senator NICKLES. Which will be paid out over what period of time?

Mr. COLBO. Over the 4-year period of planning and construction.

Senator NICKLES. So the electrical users in that area would be charged and it would be paid out over a 4-year period, totally paid for, not strung out?

Mr. COLBO. Yes Sir.

Senator NICKLES. Mr. Sampson, you had some objections to that. Is that correct?

Mr. SAMPSON. No, we had objections to having appropriation language request for congressional appropriations versus what you just mentioned. We feel that the authority already exists, or the responsibility lies with the BPA and the authority already exists for them to proceed with this. We think this is a scapegoat on their part to request congressional appropriations within this bill's language. We feel it's their responsibility. They should already be proceeding with this.

Senator NICKLES. We don't have Bonneville witnesses today but we'll solicit their input on this matter as well. And also a response, we will solicit a response from Bonneville pertaining to some of the suggestions you've made as well.

The CHAIRMAN. I have two or three points that I'd like to clarify.

Mr. Broadbent, can you tell me whether the Yakima irrigation facilities receive credit for downstream flow enhancement from power revenues?

Commissioner BROADBENT. No I can't.

The CHAIRMAN. Would you provide that for the record?

Commissioner BROADBENT. We'll provide it for the record.

[The requested information follows:]

Yakima Project irrigation facilities do not receive credit from power revenues specifically for downstream flow enhancement resulting from project operation. However, the most recently constructed divisions of the project, the Rosa and Kennewick Divisions, are scheduled to receive financial assistance from the Federal Columbia River power system to assist in the repayment of irrigation costs, as provided for in Public Laws 89-448 and 89-561.

The CHAIRMAN. The $23 million of facilities that are mentioned here for fish enhancement and irrigation, are those facilities that are associated solely with the Yakima?

Mr. COLBO. Yes.

The CHAIRMAN. They are not facilities or enhancement on mainstream facilities?

Mr. COLBO. No, they're strictly related to the Yakima system.

The CHAIRMAN. Mr. Sampson, you've suggested that the Yakima Tribe be put in the same position as the State is with respect to reimbursement of expenditures if I understand your statement correctly. Is that right?

Mr. SAMPSON. Yes, that's true.

The CHAIRMAN. The administration has suggested that the legislation be amended to change the approval authority from the Bureau of Reclamation Commissioner to the Secretary of the Department of the Interior.

Commissioner BROADBENT. I concur with that. I think that's the standard procedure.

The CHAIRMAN. That's really a technical change rather than a substantive change.

Commissioner BROADBENT. Yes.

The CHAIRMAN. Under either the present bill or under that proposed amendment it requires a prior approval of the Federal Government for the facilities for which credit would later be granted.

Commissioner BROADBENT. Yes, sir.

The CHAIRMAN. Is the tribe agreeable with that language provision with respect to prior approval for expenditures taken by the tribe?

Mr. SAMPSON. You mean they be the only, let me see if I interpret it correctly. They be the only ones that would pass on prior approval?

The CHAIRMAN. That the Federal Government would have a prior approval on facilities for which credit would be given.

Mr. SAMPSON. Included in one of our recommendations within our prepared testimony, one of our requests is that we be included as well. And I think that is fully justified by our dual relationship of having irrigation rights as well as fishery rights.

The CHAIRMAN. You want prior approval of the facilities?

Mr. SAMPSON. Correct.

The CHAIRMAN. My question is not directed primarily toward who has the authority to make a judgment as to whether the facility should be established. My question is with respect to which facilities would be eligible for the reimbursement or the credit for reimbursement. I understand the desire of the tribe to participate in the design and construction decisions. My question deals more with which facilities would be eligible for reimbursement of credits.

Mr. WEAVER. I think those two things run hand in hand because there is only a finite number of projects in the Yakima basin. If they were to be built by any of the parties other than the Federal Government, I'm sure that that party would be seeking credit against any future obligation.

The CHAIRMAN. I'm sure they would seek it. The question is whether or not they would require prior approval for such a facility before they would be eligible for reimbursement.

Mr. WEAVER. I understand that. If they were not able to get that approval I doubt very much if they would go ahead and fund the project.

The CHAIRMAN. Then I would take from that action that whether you like it or not you expected that to be a condition.

Mr. WEAVER. That's correct.

The CHAIRMAN. I ask for an understanding so that our record would indicate whether or not that is what is intended.

There is a point that needs to be made and I know that Senator Evans will participate in this discussion, not necessarily today but over the weeks and months and years to come. With respect to what was meant by the Northwest Act and whether or not the intention of the tribe is correct that no further congressional action is necessary to authorize any direct BPA activities, and it might be well just for the record at this point at least to express my understanding of that relationship. And I don't mean to precipitate an argument but I do not wish to allow this occasion to pass without expressing my own concern and belief with respect to that relationship.

Bonneville Power Administration is generally given its instructions or congressional oversight and approval of its activities in its budget submission to the Congress of the United States, which lies before the Appropriations Committee. And the Appropriations Committee takes actions with respect to their budget.

There are a couple of exceptions to that rule in which Congress has as a matter of fact legislated through the authorizing committees, through authorizing legislation, what directions Bonneville will take. We just had an issue raised on the floor of the Senate with respect to that chain of authority and restrictions on that authority and congressional oversight when it came to the matter on the Interior Appropriations bill which deals with the possible change in financing for the Washington public power supply system facilities that are under a net billing contract arrangement with the Bonneville Power Administration.

The Senate voted on a point of order to overrule the ruling of the Chair. In effect again affirming that the general oversight is through the appropriations process. That is a position that I supported. It is a position that I do support although the authorizing legislation would perhaps come through this committee rather than through the Appropriations Committee. But I believe it is the precedent, it is the general rule. The Senate at least has voted that at the present time.

The second question then would occur with respect to what was intended in the Northwest Act with respect to fish and wildlife mitigation, and there I may have a slightly different view as to whether or not the general language in the Northwest Act in effect is a blanket authorization, preliminary authorization, by the Congress for whatever actions the Northwest Council may wish to suggest and whatever actions Federal agencies may wish to take with respect to the Bonneville Power Administration. That I believe, has yet to be sorted out at this level.

I appreciate the suggestions that have been made by the Yakima Nation as to what that relationship will be, but I don't think it's that clear that Congress has yet determined that all Federal agen-

cies have relatively free access to unlimited funding by way of Bonneville and that there is no Federal oversight outside, or no congressional oversight outside of the single instance of approval of Bonneville's operating budget.

I think Congress will have to deal with that question a little further. I don't mean to exacerbate this discussion, but I think it's important as we begin the process of implementing what was done to make a record as to where we may stand and to signal to various parties that at least there is some concern about what that relationship may be.

There is one other matter which is also inherent in this and that is whether or not the Northwest Council's recommendations are mandatory or suggestive to other Federal agencies who must seek their authority through authorization in Congress. That also has been raised in discussions but has not yet been resolved.

My own strong view is that Congress did not intend to abbrogate its authority over the oversight of other Federal agencies by way of suggesting that the Northwest Council can adopt a plan which is then mandatory upon all other Federal agencies and Bonneville must provide the funding and Congress has nothing to say about that authorization or that activity.

I can understand the people who desire the results, they seek that authority. But I very much doubt whether Congress intended that. I certainly did not and I doubt very much that Congress will accept that interpretation of the Northwest Act.

I just say that for the record, not to exacerbate this particular problem at this particular time, because I fully support what we're trying to do in the Yakima.

I do believe that there is a real problem in the Yakima. I think the study clearly ratified what many people had been saying for a long period of time.

I'm concerned that the rights of the Indian, or the Yakima Indian Nation have not been fully met. I think there has been an interference with those rights in the development of the irrigation. I think we have a responsibility as a nation to meet that tribal obligation, the obligation to the tribe. I think we also did not take adequate consideration of those rights nor of our other concerns, our own concerns, not just concerns for the rights of tribal fisheries, but also our own concerns about fisheries within these streams in the Northwest and we're going to try to move to meet those problems as best we can at this late date, to mitigate and to enhance.

But we do have some questions that are going to be asked and we'll have to address those. The question is whether or not the fisheries in the Yakima River should be a problem for the people who are the water users within that basin or whether they are an obligation of the power users of the Columbia River system. I'm not certain that the users in Oregon, the balance of Washington, the State of Idaho, and those portions of Montana and Nevada that have Bonneville Power, are necessarily obligated through their power rates to pay for what was done on behalf of irrigators in the Yakima basin any more than I would think that people in Washington or Oregon or the balance of Idaho might be responsible for the mitigation of fisheries because of a reclamation project in some

tributary in the State of Idaho, even though we might wish to find an answer to that question.

I don't mean to prejudge that answer at this time, just elevate it, at least the consciousness that this is a problem that we're going to have to try to sort out.

And finally, Mr. Chairman, I apologize for a somewhat lengthy statement at this time but I think it's important as we start acting under the Northwest Act to get our ground rule firmly established so that we will have some consistency as we move forward to taking other actions throughout the Northwest with regard to this fish and wildlife mitigation which is a very very important part of that act and I fully support and I want to see it implemented as fully as we can.

And finally, Mr. Chairman, I think I also ought to for the record state that I have at least some conflict of interest in this instance because my brother-in-law is an involved member of the Yakima Nation.

Senator NICKLES. Thank you.

Senator Domenici, do you have any comments?

Senator DOMENICI. No.

Senator NICKLES. Senator Wallop.

Senator WALLOP. No.

Senator NICKLES. Senator Hecht.

Senator HECHT. No.

Senator NICKLES. Senator Evans.

Senator EVANS. Mr. Chairman, first let me on behalf of my colleague Senator Gorton, express appreciation for your willingness to hold this hearing and to bring this issue in front of the Senate. And also Mr. Chairman, I appreciate your comments on the complexities we all face in the carrying out of a new act through a new body. And as I suspect everyone in this committee probably understands, little did I know 10 days ago that I would be sitting on this side of the podium rather than where Mr. Colbo is now sitting.

Let me try in a brief moment to explain as clearly as I understand it the potential which exists for this first major effort under the Pacific Northwest Power Act. We have an opportunity it seems to me at an exceedingly cost effective level to do two things. To begin to stabilize the flow of Yakima for agricultural purposes, and there are some serious problems now in that respect. To begin to restore fish runs in an area of the Columbia Basin where an enormous run once existed, where there are relatively few impediments, major impediments at least, to restoration. And where we can go a long way with relatively small amounts of money and offset mitigation for the damage caused to fish runs by the mainstem dams on the Columbia River. In that respect, Mr. Chairman, I think the expenditure to the degree it comes through repair money probably is legitimate for all repairs of the Northwest because it can be viewed at least as partial offsite mitigation for the damages caused by mainstem construction which does affect and benefit all citizens of the Northwest.

But here we have an opportunity where the State of Washington has agreed to put in $14 million, where the Pacific Northwest Power Council has suggested a complete range of fish passage facilities for approximately $23 million. Those in combination will take

a major first step toward restoration of a significant salmon run and ultimately after appropriate studies are done, hopefully there will be a significant reservoir enhancement that will finally produce the kind of stability in both fish flows and irrigation that will be necessary.

My concern is that we take prompt action, and I do understand the necessity of sorting out the relationships in the appropriate way in which money is set forth for these purposes. I would hope that this legislation does accomplish the necessary sorting out between Federal agencies as to their ability to accept responsibility or accept appropriations which may come from elsewhere in this specific instance.

I am a little disappointed that Bonneville is not represented here this morning, but I think it's terribly important to determine from them before the current rate case is closed, whether they are willing to set aside sufficient moneys during the period covered by this rate case to insure that those fish facilities can be constructed on time and in a way to begin the enhancement if no other resources are appropriated in the meantime by the Congress. And I'm afraid at this time they do not intend to do so, and that would disturb me greatly.

The amount of money as I understand it would be $3 million in fiscal year 1984 which they have set aside; $12 million in fiscal year 1985 up to the end of the rate case. And if that amount of money which represented one-half of 1 percent of this rate case were included then we could be assured that all of this early procedure would occur in the most prompt and best way possible.

I would like to ask Mr. Colbo if that is your understanding on behalf of the Pacific Northwest Power Council as to the direction this process should take, and you may wish to explain a little further the fish facility or fish enhancement facilities that are contemplated during the next 2 years by the council.

Mr. COLBO. It is our understanding and our desire to get at it, Senator Evans. The kinds of measures that we are talking about are modern fish screening devices, modern fish passage facilities, irrigation projects constructed as those in the 1900's and since then. But those kinds of things, and they are most cost effective to use in the Yakima and that's why we chose it as offsite mitigation and more or less a centerpiece of a fish enhancement program adopted by the council.

Senator EVANS. I understand the chairman's concern that we insure that there isn't an inordinate amount of money spent on behalf of one section of the Columbia Basin and paid for by ratepayers throughout the Columbia Basin. Has the council determined whether the $23 million which is the total amount of money required for fish facilities is likely to exceed the offsite mitigation responsibilities on the mainstem of the Columbia?

Mr. COLBO. That question has been addressed Senator Evans by the council. The initial indication is no it will not exceed. There are provisions, however, should it exceed to credit any excess against Bonneville obligation to repay for the system itself. So we have recognized that. There are currently studies going on that are not mentioned in my testimony to determine what those obliga-

tions are and to provide an adequate accounting system against which those expenditures can be put.

Senator EVANS. With the proposed amendments that have been suggested, are you satisfied that the necessary interrelationships between the Federal agency, between Bonneville, the Bureau of Reclamation, and others can readily be met and there would be no remaining impediments to the necessary shifting of money, or getting ahead with these projects?

Commissioner BROADBENT. Senator Evans, as far as I can determine from our regional director, Mr. Lloyd, who I believe you know, with the proper authorization, we see no problem in the technical transfer of money, nor do we see any problem in the administration of that money to accomplish the purpose if we are properly authorized to do so by Congress, either in acts passed as a result of the Northwest Power or authorization by Congress.

Senator NICKLES. Thank you.

We've scheduled this hearing primarily on the credit issue as proposed in S. 1027 and it has been expanded through the requested amendments by Senator Evans, Mr. Colbo, Mr. Spencer, and others, to include fish mitigation. We're willing to discuss this and the issue is they are appropriate, but it's a little more than the original legislation that was introduced by Senator Gorton.

A couple of quick questions, Mr. Spencer, if you did not receive this credit, would you build the dam anyway?

Mr. SPENCER. We could not because our legislation requires that we are able to secure a contract with the Secretary of the Interior to take title to it, and without it the Secretary of the Interior would have no authority to take title to the works that we would construct.

Second, the legislation appropriating the money to us says we have to in that contract be able to know that we would have a credit against any future cost sharing.

Now we're not talking about reimbursement, just against any future cost sharing. And without this legislation, that would not be possible and therefore we could not proceed.

Senator NICKLES. Wouldn't you just amend that contract?

Mr. SPENCER. My legislation says I have to be able to obtain that from the Interior, and Interior does not have the authority to do that without the legislation.

Senator NICKLES. Was the fish enhancement included in the House bill that passed the subcommittee?

Mr. SPENCER. To some degree it was. It does talk about crediting for fish passage and it does give, if we were to build any fish passage facilities it would be the same requirement but it does not address the transfer of funding from the Secretary of Energy to the Secretary of Interior, and that's a principle part of the amendments.

Senator NICKLES. Was it brought up over in the House?

Mr. SPENCER. Yes it was. I discussed it with the sponsor of the bill in the House, excuse me, Congressman Morrison, and he's very interested in that, and he's willing to cooperate if the bill comes back.

Senator NICKLES. If there's no further questions we'll dismiss this panel and we'll go to our third panel.

This will be on S. 752 which deals with the Colorado River Basin Salinity Control Act.

Our first witnesses will be Commissioner Broadbent, and Richard Siegel.

STATEMENT OF HON. ROBERT N. BROADBENT, COMMISSIONER, BUREAU OF RECLAMATION, DEPARTMENT OF THE INTERIOR, ON S. 752

Commissioner BROADBENT. Mr. Chairman, I have a formal statement which I'd like to present for the record along with proposed comments, section by section, of the bill and the position of the administration.

Many of us have been involved in the Colorado River Salinity Control Act, title II, for many years. I, as a resident along the Colorado River and a public official, was involved in it for many years before having the opportunity to serve in this position.

I think many of us along the Colorado River have recognized the problem that we have with salinity on the river. As a resident our sole source of water for many years was the Colorado River. We saw the increase in salinity over that period of time and recognized that we had a problem, particularly as we tried to meet the demands of more users along the river and the demands of the Mexican Government as a result of a treaty that was entered into by the United States and Mexico.

In general, I would like to say that the administration and the Department of Interior support S. 752. We would like to point out several provisions which we feel should be modified or changed. We do not support the authorization for construction of the six major projects until the appropriate feasibility studies have been completed. We would like to indicate that we feel that a proper proposal for cost sharing on the salinity control projects is 25 percent plus interest. And it is our feeling that this could be pretty broadly supported by the basin States.

We support the onfarm programs because of their cost effectiveness and would certainly support the Department of Agriculture and Mr. Siegel in any comments that he would have on this section.

We have some concerns and would ask that you modify the section that gives a veto power to the advisory council or to the Governor on any projects. I think the salinity control forum might support us in that.

We feel that one of the issues that we still see as a problem on the salinity control program is the issue of water rights. We hope that you might encourage the basin States to modify some of their laws to accommodate the salinity control projects. We see some problems with present State law and State water rights as they pertain specifically to salinity control projects and our ability to implement some of these projects.

We would support the authorization of the Secretary to modify certain projects and would ask you to change the bill to retain the authority provided in Public Law 93-320. We find as the technology improves that we are able to find more cost-effective ways to answer some of the problems. If we're able to find a more cost-ef-

fective way to implement any salinity project along the Colorado River, we would like the authority of the Secretary to allow us to go ahead with that modified project.

As you know, the salinity control project is not based on principles and guidelines as adopted by the administration but on cost effectiveness, and we feel that the exemption of this program from the principles and guidelines as proposed in this bill is appropriate. These projects should be built on the basis of cost effectiveness. Those that are the most cost effective in their ability to provide the benefits should be developed first. This is similar to all types of water quality legislation, and it is really more of a water quality problem than it is a water quantity problem.

In general that covers most of the comments that we have on the bill. Mr. Chairman, I would be happy to answer any questions.

[The prepared statement on S. 752 of Commissioner Broadbent follows:]

WITNESS STATEMENT

Statement of Robert N. Broadbent, Commissioner of the Bureau of Reclamation, Department of the Interior before the Senate Subcommittee on Water and Power of the Committee on Energy and Natural Resources on S.752 To Amend the Colorado River Basin Salinity Control Act to Authorize certain Additional Measures to Assure Accomplishment of the Objectives of Title II of such Act, and for other Purposes

September 15, 1983

Mr. Chairman, members of the Subcommittee, on behalf of the Department of the Interior, I am pleased to appear here today to comment on S.752 which would amend the Colorado River Basin Salinity Control Act to authorize certain additional measures to assure accomplishment of the objectives of Title II of such Act, and for other purposes.

Title II of the Colorado River Basin Salinity Control Act is intended to implement water quality measures for meeting Colorado River salinity standards which were adopted by the Colorado River Basin States and approved by the EPA in 1975. The Act authorized construction of four salinity control units and directed the Secretary of the Interior to expedite planning studies on 12 additional units. (Public Law 96-375, signed into law October 10,1980, provided feasibility authorization for 10 of those units). Two of the authorized control units (Paradox Valley and Grand Valley) are currently under construction, while the Las Vegas Wash Unit is being reformulated and the Crystal Geyser Unit has been deferred because of unacceptable cost effectiveness.

Appraisal grade plans and cost estimates have been prepared for the 6 units included in S.752 and special or status reports have been completed. These units are the Lower Gunnison, McElmo Creek, Uinta Basin, Palo Verde Irrigation District, Saline Water Use and Disposal Opportunities, and Sinbad Valley Units. S. 752 would provide for construction authorization for these units.

The Department recognizes the pervasive salinity problem on the Colorado River and generally supports many of the concepts that have been included in S. 752. We welcome the introduction of this bill as a serious attempt to remedy deficiencies in the program which have become apparent since its inception nine years ago.

The Department also recognizes the need to provide cost-effective controls for salinity in the Colorado River Basin. Even though recent flooding of the Colorado River will temporarily decrease salinity, the long-term necessity for implementation of effective control measures is still with us. The people of the Colorado River Basin States remain concerned about the present salinity concentrations which have an effect on the quality of drinking water, corrosion of facilities utilized by municipalities and industry and productivity of agriculture.

It is, therefore, necessary that the people of the Colorado River Basin, industry, local and State governments and the Federal Government work together in seeking a solution to the salinity problem. Considerable basin-wide environmental enhancement could also be accomplished through some of the measures proposed in S.752.

The fiscal implications of this legislation are of concern to the Administration. We have to better define the Federal Government's role in the Title II program with respect to international and domestic commitments and in relation to other water resources and water quality programs. Moreover, salinity problems are pervasive in Western waters: tributaries to major Western river systems except the Columbia suffer from high levels of salinity. We do not yet

know the scope of salinity control measures that will be needed in years to come, but we know that long-lead times for planning and implementation are required.

The Department believes the salinity control program should not be subject to the "Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies" which became effective July 8, 1983. The salinity control program is more closely related to the wastewaters and drainage management programs of the Environmental Protection Agency than it is to conventional water development projects. The scope and pace of the program is strongly influenced by the water quality standards required under Section 305 of the Federal Water Pollution Control Act, as amended. Therefore, a cost-effectiveness evaluation, as applied to other aspects of the EPA's clean water program, is appropriate.

I might mention that as our studies of additional salinity control units for the Colorado River Basin have progressed over the past 8 years, the attractiveness of the Department of Agriculture's on-farm program for improving irrigation efficiency have become more apparent. This program has been proven to be one of the most cost effective salinity control activities available. We defer to the Department of Agriculture for further comment and recommendations on these actions.

We suggest S.752 be amended to either provide for an interest charge on the present 25 percent repayment requirement for the capital costs or to raise the repayment requirement to 50 percent of the capital costs without interest. We prefer a provision for an interest charge because it would induce earlier repayment to reduce interest costs. The interest rate to be applied should reflect the cost of money to the Treasury.

One additional area of concern that has been identified by the Department relates to water rights and the appropriation and use of saline waters in the Colorado River Basin pursuant to the Colorado River Basin Salinity Control Act. The 1974 Act is silent on water rights. The policy of the Department of the Interior is that any such water use actions will be taken in strict conformance with State water laws. However, as we proceed with ongoing implementation activities, it has come to light that certain provisions of State water law can and most likely would complicate development of some cost-effective salinity control measures. Since this situation is a matter of State authority, we recommend that the Colorado River Basin Salinity Control Forum actively address these issues and recommend actions to allow this program to proceed without infringement on State water laws.

We do not support authorization for construction of six additional salinity control units until feasibility studies and the prescribed reviews have been completed. We recommend deleting the provision relating to oversight authority by the Congressional Committee for expenditure of funds.

Under the Supreme Court's recent decision in INS vs Chadha, 51 U.S.L.W. 4907 (U.S. June 23, 1983), committees of the Congress may not be granted power to take action that affects in any way the legal rights or obligations of persons, including Executive Branch officials. Because this provision would purport to give such powers to committees of the Congress, it is unconstitutional under the Chadha case.

In addition, the provision for veto of a report by the involved Governor or the Advisory Council, although not without precedent in Federal statutes raises constitutional issues that have never been adjudicated definitively by the courts. In order to avoid such litigation, and because we believe this provision is unnecessary, it should be stricken.

Finally, we recommend that the Secretary's authority to modify plans be preserved. Mr. Chairman, the Department has an excellent record of working closely with the Governors of the Colorado River Basin States. This record of cooperation and the evolving nature of salinity control solutions argue strongly for preserving the authority to adopt improvements as they are developed.

New ideas for saline water reuse such as local saline water use for energy production and coal-brackish water transport pipelines, identified in our September 1981 Special Report on Saline Water Use and Disposal, offer the promise of greater cost-effectiveness as well as better resource management. The Department believes that further investigations of these opportunities should not be delayed. We look forward to innovative joint ventures with industry in the use of saline water for economic benefit and salinity control.

Following are our specific comments on each section of the proposed legislation, S.752, with the Department's position. Language to incorporate our specific suggestions will be provided for the record.

Section (1) exempts planning and implementation actions under Title II from principles, standards, and procedures promulgated pursuant to the Water Resources Planning Act.

28-181 O - 84 - 6

Department SUPPORT

Position Although the Title II program contains some water resource development elements, we believe that there are valid reasons for treating it as a basinwide pollution control program.
We note that this exemption applies to the new "Economic and Environmental Principles and Guidelines for Water and Related Land Resources...." which became effective on July 8, 1983. These Principles and Guidelines were issued under the authority of the Water Resources Planning Act.

Section (2) directs the Secretary to give preference to units or self-contained portions of units that provide salinity reduction at the least cost per unit of salinity reduction.

Position SUPPORT

The most cost-effective units should be given preference.

Section (3) restructures the act to allow additional Interior and Agriculture programs, as contained in sections (7) and (8).

Position SUPPORT

This is simply an editorial change to restructure the act.

Section (4) allows Grand Valley Unit canals and laterals to be replaced with pipe in addition to concrete lining open canals and allows additional measures to reduce salt contributions.

Position SUPPORT

In the past, this has been viewed as a more cost-effective and more locally acceptable salinity control strategy. Preliminary results of the Grand Valley construction confirm that salinity can be reduced and water conservation enhanced through these methods.

Section (5) pertains to the Grand Valley salinity control unit, and deletes the Secretary's authority to have a technical staff to assist users in water conservation for five years after money first becomes available under this title of the Act and to enter into agreements with the Secretary of Agriculture for a unified control plan. Section (8) of the bill provides a new on farm program in lieu of the less comprehensive program envisioned in 1974.

Position SUPPORT

The authority of the Secretary of the Interior expired in 1979. Experience has shown that the Department of Agriculture can do this job in a more effective manner than Reclamation.

Section (6) provides for the conditional authorization (with oversight by congressional committee) for six additional salinity control units.

Position OPPOSE

We cannot support authorization for construction until feasibility studies and the prescribed reviews have been completed.

Section (7) directs the Secretary to contract with nonfederal qualified entities for cost sharing where it is in the best interest for maximum reduction in salinity; restricts the Secretary's authority to assume long term obligations for improved canals and laterals and measures to replace incidental wildlife values, authorizes the Secretary to improve additional interconnected canal and lateral sections where local entities provide appropriate repayment (subject to the Leavitt Act on Indian lands); authorizes replacement of incidental wildlife values; provides for submission of final implementation plans to the appropriate congressional committees and Governors.

Position GENERALLY SUPPORT

A substantial Federal savings could result through joint ventures with nonfederal entities who would equitably share in the cost of salinity control. We plan to submit a technical clarification for the record to better define the relationship between this section and other repayment provisions. The proposed measures for the replacement of incidental wildlife values provide a reasonable approach to maintaining those resources.

However, the long-term operation, maintenance and replacement obligations need to be clarified regarding canal and lateral systems or other facilities undertaken to replace incidental wildlife values. Future operation, maintenance and replacement obligations regarding canal and lateral systems must remain the responsibility of the facilities' owners or operators.

Section (8) authorizes the Secretary of Agriculture to establish a separate on-farm salinity control program within the Department of Agriculture including source identification, plan development, technical and cost sharing assistance, irrigation water management and monitoring and related research demonstration and educational activities. Also included are reports to Congress, authorization of appropriation of about $200 million for 1983-1988 and a restriction on long term operation and maintenance commitments.

Position DEFER TO THE DEPARTMENT OF AGRICULTURE

Interior supports establishing such a program and defers to the Department of Agriculture on specific provisions.

Section (9) directs the Secretary to develop a comprehensive plan to minimize salt contributions from BLM lands and to submit a report to Congress and the Advisory Council by July 1, 1984.

Position SUPPORT

We need a BLM study to analyze the problem and consider alternative solutions to control the salinity contributed to the Colorado River system by Federal lands.

Section (10) excludes from the repayment formulas contributions from industries that use saline water and farmers who provide up-front cost-sharing for onfarm programs.

Position SUPPORT

We support up-front contributions for the salinity control program and agree that those contributions should be exempt from the repayment requirements.

Section (11) clarifies that the repayment period shall be for a 50-year period or the life of the facility, whichever is less.

Position REVISE

The unique nature of the salinity control program merits extra attention with respect to cost sharing. Of particular fiscal concern at this time are the repayment provisions of the Act. Those provisions permit repayment of the non-Federal share of the salinity control program (25 percent of total costs) without interest over a period not to exceed 50 years. The net effect of this repayment provision is to place nearly all the financial burden for this program on the Federal Treasury. We recommend that the repayment provisions be modified to provide a more equitable cost distribution such as charging interest on the 25 percent repayment or raising the repayment requirement to 50 percent of the capital costs without interest.

Section (12) deletes the Secretary's authority under Public Law 93-320 to modify authorized units.

Position OPPOSE

The Secretary of the Interior needs that conditional authority to be able to adopt more cost effective strategies as they are identified.

Section (13) editorial change to recognize the addition of a new section (202(b)).

Position SUPPORT

This is simply an editorial change.

Section (14) the Secretary could use funds authorized to be appropriated by section 208 of P.L. 93-320 for construction of any or all of the works or portions thereof and for any purposes authorized.

Position SUPPORT

This would allow the best use of the existing maximum authorization of appropriations. (This is consistent with our support of section (2).).

In the months ahead, we must determine the extent of the Federal role in these programs and define equitable cost-sharing arrangements among the parties involved. We look forward to working with the Committee to assure that the most cost-effective approach for achieving program objectives is identified and implemented in such a time frame as to meet established water quality standards.

This concludes my statement, Mr. Chairman. I would be pleased to answer any questions.

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Senator NICKLES. Thank you very much.

Senator Wallop, excuse me. You mentioned you wanted to have an opening comment?

STATEMENT OF HON. MALCOLM WALLOP, A U.S. SENATOR FROM THE STATE OF WYOMING

Senator WALLOP. In the interest of time I'll simply have it inserted in the record. Essentially it says that I agree with the Commissioner. There is a national obligation that is concurrent with the States' obligation on salinity control. It was after all all the countries that signed the treaty with Mexico, and not the State of Iowa or the State of California or any of them individually. And it simply addresses this point and I would wish to have it inserted in the record.

[The prepared statement of Senator Wallop follows:]

STATEMENT BY SENATOR MALCOLM WALLOP

BEFORE

COMMITTEE ON ENERGY AND NATURAL RESOURCES

WATER AND POWER SUBCOMMITTEE

Mr. Chairman. It is a pleasure to be here today to discuss S. 752, a bill to authorize certain additional measures to assure accomplishment of the objectives of Title II of the Colorado River Basin Salinity Control Act. Before looking at the proposal's specific provisions it is important to review a bit of the history which led us here.

Salt in the Colorado is nothing new. It was there even before man inhabited the area. Irrigation and other man-made conditions have only contributed to and exacerbated the preexisting condition.

In recent years, public awareness and concern about the problem have increased as the salt concentration of the water has gone up. In 1973, in response to this concern, Congress passed the Colorado River Basin Salinity Control Act (PL 93-320). This Act required the Secretary of the Interior to proceed with a series of improvements "for the enhancement and protection of the quality of the water available in the Colorado River for use in the United States and the Republic of Mexico, and to enable the United States to comply with its obligations under the agreement with Mexico of August 30, 1973."

This language is from a federal law and it creates an obligation for the federal government. Wyoming did not pass this provision. Nor did California. Nor did Colorado. And even if the state wanted to they could not have done so. The U.S. Constitution specifically prohibits an individual state from entering into a treaty with a foreign country.

Our obligation to deliver a certain quantity and quality of water to Mexico is a collective responsibility--one in which each of the 50 states share equally.

Although the states are willing to help the federal government reduce the salinity level of the Colorado, this volunteerism does not diminish the underlying federal obligation with which the Act vests them. Each dollar the states contribute to reduce the salinity level of the river should be viewed by the Congress as a windfall since it means that we will have to spend less money to accomplish our goal. Each grain of salt the states remove from the Colorado River only reduces the burden that the federal government willingly imposed on itself nine years ago when the President signed Public Law 93-320.

Although the heavy runoff which the West experienced this year has temporarily lessened the problem, we must forge ahead to develop all of the salinity control programs and to meet our legal and ethical obligations which we owe our southern neighbor.

It is my firm hope that we can move quickly to mark up this measure and pass it into law, thus enabling everyone to move ahead to solve the salinity problem of the Colorado River.

Senator NICKLES. Thank you.

We have Senator Wilson who would like to make some comments too. If you could wait, Mr. Siegel, for just a moment.

Senator Wilson, welcome, and we appreciate your coming before this committee.

STATEMENT OF HON. PETE WILSON, A U.S. SENATOR FROM THE STATE OF CALIFORNIA

Senator WILSON. Thank you very much. I am most grateful for the courtesy of the committee and the witnesses. Mr. Broadbent and Mr. Siegel were kind enough to allow me to interject my comments. I will be brief. I think you have a copy of my testimony. I will attempt to summarize it.

The salinity problem of the Colorado River has a number of obvious implications that have been discussed by prior witnesses and I think the legislation that has been introduced by Senator Armstrong and all the, with the cosponsorship of all the Senate members representing the affected basin States indicates the seriousness of the problem.

I would say that the costs that have been estimated probably have been conservatively estimated, but as you have been told they are projected to reach a figure of $267 million annually by the year 2010 if the controls that would be imposed by this legislation are not implemented.

I am sure that someone before you has described a problem in terms of the intensity, the fact that the current salinity at the headwaters of the Colorado are about 50 milligrams per liter. By the time it reaches the Imperial Dam, the last diversion point in the United States, that level is much much higher and estimated to reach a potential level of 1,140 milligrams per liter by the year 2000 if correct measures are not taken.

So I would say that, I can tell you that my constituents who are at the far end of that problem at its most intense will be enormously grateful for the assistance that is afforded by the legislation that has been introduced by Senator Armstrong. It affects not only agriculture, it affects industrial users' water. It clearly affects those who are water retailers and wholesalers for domestic consumption.

I think the solution that has been proposed here is an equitable solution in terms of the cost sharing. The Federal Government for the cost that would be involved in both the off-farm control units constructed by the Department of Interior and the other Federal costs that are involved would be reimbursed for all costs except for the benefits of the salinity control.

So I think this is an equitable measure. It is one that is decidedly needed. The cost-sharing arrangements do provide an equitable solution. The replacement of the incidental wildlife and other environmental values that may be impaired through construction of the units has been addressed.

I would be happy to answer questions. I would not take more of the committee's time, I would just indicate that my presence here is because this is a problem that is an old problem. It is a problem that has grown steadily worse and promises marked deterioration in the future if it is not addressed by this legislation.

[The prepared statement of Senator Wilson follows:]

STATEMENT OF HON. PETE WILSON, A U.S. SENATOR FROM THE STATE OF CALIFORNIA

Mr. Chairman, the rising salinity pollution of the Colorado River water has been of major concern to the seven Colorado River Basin States for many years. This pollution threatens the water supply quality for all users, creates economic waste, damages irrigated crops, causing accelerated pipe corrosion, and requires us to use excessive amounts of water in areas where water shortages are critical.

Salt is a natural element in our Nation's waters. In normal amounts, it is used in our homes, on our farms and in our industrial processes without impact or adverse effect. But when it reaches the levels in the Lower Colorado River experienced today and projected for the future, it becomes a serious problem. The Environmental Protection Agency has recommended that total dissolved salts in drinking water not exceed 500 milligrams per liter and this standard is already exceeded in the lower basin from Hoover Dam to the border.

The Colorado's heavy salt load of 9 million tons annually already is costing more than $113 million a year. Costs are projected to be $267 million annually by 2010 if controls are not implemented. The Colorado River, at its headwaters, has a salinity concentration of only about 50 milligrams per liter (mg/1). The salinity concentrations progressively increase downstream. In 1982, the salinity was 879 mg/1 at Imperial Dam, the last major diversion point on the Colorado River in the United States. Salinity could reach a level of 1,140 mg/1 at Imperial Dam by 2000 if corrective measures are not taken. Increased salt concentrations in applied irrigation water are resulting in agricultural losses on more than 1 million acres of irrigation farmlands.

California, particularly the Imperial Valley, is greatly affected by the salinity problem. Agriculture production in the Imperial Valley is threatened by the increasing salinity levels.

The bill has four principal objectives to solve the salinity problem:

(1) Authorization of six new off-farm salinity control units, to be constructed by the Department of the Interior. These units typically consist of lining irrigation canals and ditches or placing them in pipe, to reduce contact between saline western soils and the river.

(2) Authorization of five new on-farm programs, to be administered by the Department of Agriculture. These will be entirely voluntary and in cooperative with private landowners. These projects typically consist of installing automated irrigation equipment to reduce the amount of water washing salt into the river.

(3) Cost-sharing arangements so the Federal Government will be reimbursed for all but the salinity benefits of the units.

(4) Replacement of incidental wildlife or other environmental values that may be impaired by construction of these units.

The salinity problem requires our farmers to use excessive amounts of water for leaching to avoid salt buildups in the soil in an area that produces a substantial percentage of our Nation's winter vegetables and fruits. It affects the health of those required to maintain low sodium diets and requires them to purchase distilled or other treated waters. It shortens the life of water piping, water heaters, and other water using equipment in our homes and our factories and industrial plants. If the problem is not resolved, the salinity levels are projected to increase dramatically.

The bill further provides for the protection of fish and wildlife and other environmental values that may be impaired through the implementation of the salinity control measures.

I believe this is a strong program which is necessary to clean up the Colorado and avoid further serious impacts in the Lower Basin States. I am pleased that all seven Basin States are strongly supporting its adoption. California and the other Basin States have suffered far too much damage from the salinity problem and this legislation will do a great deal towards implementing a comprehensive salinity control program. I urge your approval of S. 752.

Senator NICKLES. Thank you very much. We appreciate your appearance before the committee today. Thank you.

I will place in the record at this point statements from Senator Hatch, Garn, and Goldwater.

[The statements follow:]

Colorado River Salinity Control Act of 1974

Senator Orrin G. Hatch
September 15, 1983

I would like to take this opportunity to support S. 752, a bill introduced by Senator Armstrong of Colorado and cosponsored by myself, which would authorize additional salinity control measures to be taken in order to fulfill the objectives of the Colorado River Salinity Control Act of 1974.

As you know, the Colorado River is the lifeblood of the West. More than 15 million residents of the states of Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming benefit from the River's existence and countless others will become dependent on the river as growth continues to boom on the West coast.

Water from the Colorado supports the agricultural, industrial and municipal needs of many areas in the region, as well as providing sustenance to the many forms of wildlife along its banks.

However, a major problem is arising as a result of increasing salinity concentrations along the river's path, causing considerable economic damage to agricultural, municipal, and industrial water users, as well as environmental damage to important fish and wildlife habitats. Increased salinity effects municipal water supplies causing additional soap and detergent consumption, corrosion and scaling of metal water pipes, water heaters, accelerated fabric wear, added water softening costs, and in extreme cases, abandonment of supply.

Approximately half of the present salinity concentration in the Colorado river can be attributed to natural resources. The remaining half have been caused by man. Unfortunately, the construction of dams, which are an absolute necessity for survival in the arid West, has contributed to the increase of salinity levels in areas surrounding their construction.

The results of high salinity have had and will continue to have a negative economic impact on the area surrounding the river's path. For irrigators, the higher concentrations cause decreased crop yield, altered crop patterns, increased leaching and drainage requirements, and increased management costs.

It is estimated that the high salt load which enters Lake Meade, for example, in the Lower Colorado River Basin adversely effects more than ten million people and one million acres of irrigated farmland in the United States.

In 1981, the cost of damages to residents of the area exceeded $96 million dollars and unless something is done to alleviate the increased salinity in the area, the damages could rise to approximately $237 million by the year 2000.

In 1974, Congress passed legislation dealing with this issue. Although significant benefits have been derived from the implementation of the Act, the salinity problem, as I have previously mentioned is continuing and will continue to be aggravated as the basin develops.

S. 752 will mitigate some of the salinity problems I have described, by:

1. Authorizing six new salinity units (one of which will be located in Uintah Basin in Utah) which will be constructed within the fund ceiling established in the 1974 Act.

2. Improving a large network of canal and lateral systems.

3. Providing for the replacement of wildlife and environmental values which might be impaired.

4. Providing for implementation of a more streamlined and effective on-farm control program through the Department of Agriculture.

The program outlined in this bill comprehensively addressed the problem of salinity through the use of on-and off-stream management techniques.

The on-farm program will aid farmers in irrigating in the most efficient way possible, avoiding overuse of water and water evaporation, thereby lessening the amount of salt which is leached in the soil. This program has been particularly successful in the reclamation of land which has been lost to salinity, as todays witness from the Uintah Basin will attest.

The construction of water canals and installation of salinity units will allow water to run its course without coming into contact with salt laden soil.

In addition, the enactment of this legislation will ensure the balance of the environmental habitat is maintained, and should benefit wildlife adversely affected by high salinity levels.

Mr. Chairman, as a resident of Utah, one of the seven states which is served by this important river, and as one who is sensitive to the water problems of the West, I urge that serious consideration be given by this committee to the adoption of S. 752. The enactment of this legislation will help to maintain and preserve the Colorado River benefitting not only those residents of my home state of Utah and the six states surrounding her, but the entire nation as well.

In addition, it will help with the obligation of this nation to Mexico to deliver good water across this border.

STATEMENT ON S.752 BY SENATOR JAKE GARN

Mr. Chairman:

It is a privilege for me to once again voice my full support for the Salinity Control package included in the text of S.752. I only hope that this year the Congress will move expeditiously and approve the Salinity Bill so that this important work can begin.

As you know, the 1,400 mile-long Colorado River is the lifeblood of 17 million people from Denver to San Diego. It irrigates approximately 1.5 million acres of prime farmland in seven states.

The need to eliminate salt loading in the Colorado River system is obvious. Not only do saline waters wreak havoc on our own agricultural interests, but cause ill-will with our neighbors in Mexico with whom the waters of the Colorado are shared.

The estimated salinity damage on the Colorado River costs $100 million a year and will double by the year 2000. In addition to the economic damage, there are serious environmental losses including damage to some of our most important fish and wildlife habitats and an increasingly serious threat to public health. The salinity levels in the Colorado River are now well above the maximum recommended by the Environmental Protection Agency's Secondary Drinking Standards.

Through a comprehensive approach, S.752 will make a significant improvement in the quality of Colorado River water.

In Utah, I am already very favorably impressed by the On-Farm Salinity Control Programs which are administered by the ASCS in the Uinta Basin. On-Farm Salinity Control has provided substantial removal of salt loading in river drainages while allowing our farmers the benefits of prudent irrigation practices.

The On-Farm Salinity Control feature actually represents a partnership between local farmers and the government, and provides taxpayers with tangible, positive results in the way their tax dollars are spent. Utah farmers support this feature of the bill enthusiastically.

I also support the Bureau of Reclamation features of S.752. The authorization of six new Off-Farm Salinity Control units in the Colorado River Basin states will significantly enhance desalinization efforts on the river while complimenting the On-Farm programs of the Department of Agriculture.

Finally, I believe it is important that this legislation be viewed for the positive affects it will have on this country's relations with Mexico. America's treaty obligations with our neighbor should be met in good faith and can be when this comprehensive water improvement package becomes law.

I thank the committee for this opportunity to express my support for this bill.

Statement by
The Honorable Barry M. Goldwater
before the
Subcomittee on Water and Power
on
S, 752, a Bill to amend the
Colorado River Basin Salinity Control Act
September 15, 1983

Mr. Chairman and members of the Subcommittee, I appreciate the opportunity of presenting a statement in support of S. 752, a bill which I am pleased to co-sponsor to authorize certain additional measures to assure accomplishment of the objectives of Title II of the Colorado River Basin Salinity Control Act, and for other purposes.

It has been nearly a decade since the Colorado River Basin Salinity Control Act was enacted into law, and there is great urgency now to have that law refined to further those activities that have proven to be most cost effective and to authorize additional measures to keep the program on a sound course.

The bill before the Committee represents a consensus of the seven Colorado River Basin States on how best to achieve the objectives of reducing the salinity of the Colorado River.

I want to commend the Chairman for scheduling this hearing to obtain the views of those officials who have been directly involved in the program from State and Federal agency levels, as well as those who have actually carried out those conservation practices. A great deal has been accomplished through this unique partnership, and there is much left to be done.

At the Senate hearings on this legislation a year ago representatives of the State Department, the U.S. Commissioner, International Boundary and Water Commission and the Director of the Office of Mexican Affairs, stressed how important it is to assure that the sensitive salinity issue with Mexico remain under control. For more than three decades the quality of the water delivered to that country was the most serious issue that beset our relations. In the furtherance of the objectives of the 1974 Act, implementing the agreement with Mexico, the State Department supported

28-181 O - 84 - 7

the basinwide standards requiring the maintenance of 1972 salinity levels upstream from Imperial Dam which Title II of the Act is designed to meet. That's the problem we face.

At the same time the seven States need to be assurred that they can develop their compact apportioned water supplies and that adequate measures are taken to reduce the millions of dollars of damages attributed to poor quality water on public health, industry, crops, and the environment.

Meeting the water quality standards adopted by each of the Basin States and approved by EPA is going to require the continuing close coordination of activities by the Departments of Interior and Agriculture, the States, and water users. S. 752 provides such a framework in which to proceed to accomplish the objectives of salinity control.

The legislation before the Committee would authorize the Secretary of the Interior to spend the funds authorized by the Act of 1974 on 10 salinity control units which include the four that were originally authorized by the Act. The larger number of salinity control units will allow the Secretary to determine where the funds can be most cost-effectively spent. It is not intended that every component of every one of the units would be constructed.

The Department of Agriculture's extensive experience and technical expertise in onfarm irrigation water management provide some of the most cost-effective means of salinity control. The success of the Department's activities in the Basin over the past nine years clearly warrants the creation of a separate tailor-made program within the Department with the costs shared by the landowners, States, and Federal Government.

Any delays in this program will seriously jeopardize accomplishing the objectives outlined in Public Law 93-320, and I urge the Committee to give favorable consideration to S. 752.

Senator NICKLES. Mr. Siegel.

STATEMENT OF RICHARD D. SIEGEL, DEPUTY ASSISTANT SECRETARY FOR NATURAL RESOURCES AND ENVIRONMENT, DEPARTMENT OF AGRICULTURE, ACCOMPANIED BY JOSEPH HAAS, DEPUTY CHIEF, SOIL CONSERVATION SERVICE FOR NATURAL RESOURCE PROJECTS

Mr. SIEGEL. Mr. Chairman and members of the subcommittee, I am Richard D. Siegel. I am Deputy Assistant Secretary of Agriculture for Natural Resources and Environment.

On behalf of our Department and Secretary John Block, I want to express our appreciation for being here today to discuss the agricultural component of S. 752. I would also point out that the agricultural component of S. 752 has been embodied in a bill which the administration has submitted as its own legislation dealing with the agricultural component alone. That bill has been introduced today. It is bill number S. 1842, and its sponsors are Senators Armstrong, Hatch, Garn, Wilson, and Goldwater. So in referring to any differences that the administration might have with the agricultural component of S. 752, our preferred version of the agricultural provisions would be embodied in the bill that was introduced today, S. 1842.

My statement runs 12 pages in length and I wish to summarize it and also to include for the record this blue covered pamphlet which is the Department of Agriculture's 1982 annual report on its work in the Colorado River Basin on the salinity control program.

Now in my statement I dwell on many of the facts which have been brought up earlier by Senator Wilson and by Senator Armstrong, about the economic problem, the water quality problem, and the international relations problem which salinity is causing in the Colorado River Basin.

My statement goes on to describe the treaty with Mexico and the adoption of minute 242 which sets the actual limit on salinity entering Mexico. Following that we came to the 1974 act, the Colorado River Basin Salinity Control Act, Public Law 93-320. This was an act which brought three agencies in the Federal Government together to work on this problem: the Department of the Interior with its Bureau of Reclamation activities and its public land activities, the EPA which monitored and set the water quality standards, and the U.S. Department of Agriculture, which brought into this effort its experience in working directly with farmers and landowners, giving them technical and financial assistance for the improvement of their land and water resources on private land. The USDA has been giving them information through the Extension Service, and technical assistance through the Soil Conservation Service, a measure of financial compensation, cost sharing payments, to complete necessary conservation work through ASCS, the Agricultural Stabilization and Conservation Service. So since 1974 the Department of Agriculture has been a full and active partner in the work that has been carried on under Public Law 93-320.

The Department of Agriculture has focused on 10 different salinity-loading areas. Seven of them have completed studies and the three remaining areas will be studied. These areas account for 80

percent of the salinity which is caused as a result of irrigated agriculture.

In viewing the overall salinity problem, more than half of the salinity problem is attributable to natural phenomena such as evaporation and natural salt seepage which has nothing to do with irrigated agriculture. But irrigation activity of agriculture has been identified as the cause of 37 percent of the gross amount of the salinity problem that we're dealing with.

So the Department of Agriculture is taking its role very seriously and has looked at the 10 salt unit areas along with the Department of the Interior to see how it could work in conjunction with the Department of the Interior. The Department of Interior is able to do things with structural measures off the farm. The Department of Agriculture has brought its expertise and its resources into the search for solutions involving private landowners on the farm. These have included: improvements in irrigation efficiency by lining of old earthen irrigation ditches, so that seepage from these ditches would not be a problem; and working with farmers to advise them on how they can level their fields so that irrigation water will be applied to the crops in an economical and efficient fashion and overirrigation will not take place. When overirrigation takes place water is flushed down into the subsurface saline layers of soil below the crop roots where water isn't needed, where water has no need to go. And yet this is the irrigation water that returns to the river carrying into the river an extra amount of salt.

Now the 10 areas which the Department of Agriculture has targeted for study, the 10 units which are listed on page six of my prepared statement, will account for 80 percent of the salinity which is caused by the work of agriculture. We have targeted in on these areas and we have come up with a plan to complete the onfarm conservation work with these areas by the year 2000 at a total estimated cost of $369.7 million which is only a small fraction of the benefits that will be realized when this agricultural salinity control work is complete.

In USDA, we have proposed this legislation at this point for one specific reason. The work that we have done since 1974 with the salinity control program has convinced the Department of Agriculture that it has insufficient legislative authority to do its full share of the work. The legislative authority for the Department of Agriculture in title II is found under section 201(c). This is a rather vague and general description that directs the Department of Agriculture to work with its own resources in assisting the Interior Department. In the several years of work that our Department has done, we have concluded that we need a new single legislative authority in the Department of Agriculture addressed solely to salinity control work rather than the piecemeal and fragmented approach that we have now to carry it out.

This committee does not have to deal with the Department of Agriculture but the Department of Agriculture has many different individual legislative authorities that bear on the matter of conservation. We have the Soil Conservation Service technical assistance program, we have the Soil Conservation Service river basin program., we have the Extension Service with its education activities , and then in a completely different agency, the Agricultural Stabili-

zation and Conservation Service, we have another major program that deals with conservation called the agricultural conservation program which makes the cost-sharing payments which are so important to the farmers and the private landowners.

Colorado River salinity in our Department has had to tread through all of these different authorities. The need for Colorado River salinity can't compete well within each of these separate authorities for its necessary funds. A separate budget line item for salinity in USDA's budget, as this would give us, would allow us to focus on this critical job of Colorado River salinity. So S. 752 and S. 1842, the bill that was introduced today, would put the Colorado River salinity efforts of our department on a firm and unmistakable footing. These efforts could then transcend many of the restrictions pertaining to funding and the legislative restrictions that we've encountered in dealing with this.

Now one of the principal legislative restrictions is the annual cost-sharing maximum of $3,500 per year. A recipient of a cost sharing payment under the Colorado River salinity program is limited to $3,500 a year because the money he's getting comes from the general fund for conservation cost sharing. This has proven to be a hobbling obstacle in USDA's working with individual landowners. Many of these improvements in salinity well exceed $3,500 a year and rightfully so.

This has meant that the work done on an individual farm has to be spread out over a sufficient number of years so there can be $3,500, and no more, doled out each year. This has stretched out projects which could be completed in a much more expeditious and much more economical manner if they weren't restricted by the iron rule of $3,500 per year.

This cost-sharing program has another handicap and that is that irrigation districts are not eligible to receive cost sharing and canal companies are not eligible to get cost sharing. The ACP cost-sharing program does not have the flexibility to address the different kinds of entities of the Colorado River Basin that are part of the salinity control picture.

We have to get this program out from under the ACP rigid criteria and the other rules. This program needs a better tool, a better legislative framework in the Department of Agriculture to do its job, and this is what we're calling for.

Now we have taken issue in six instances with the version of the agricultural program that's contained in S. 752, and my statement outlines precisely the amendments that we would make to S. 752, and a description of these amendments are found beginning on page 10 of my prepared statement. One has to do with mitigation of wildlife values. Another has to do with the veto power which S. 752 would give to committees of Congress which we feel would be affected by the recently adopted Supreme Court decision finding legislative vetoes unconstitutional. I described that in my statement.

We also wish to proceed in the funding and implementation of this program with as much flexibility as possible for the administration, given the economic situation and the need for fiscal austerity. We feel the implementation schedules provided in the bill

should be modified to allow the administration the flexibility that it needs.

This administration is committed to a sharpened emphasis on the Colorado River salinity problem. We feel that many benefits will be achieved by this program in terms of water quality agricultural productivity. We will save water and we will improve productivity of our irrigated agriculture as well as improve water quality.

We want to play a meaningful role in the Department of Agriculture in the control of Colorado River salinity and we hope by the adoption of the legislation we're seeking we can have the tools to do the job.

Thank you very much.

[The prepared statement of Mr. Siegel follows:]

STATEMENT BY
RICHARD D. SIEGEL
U.S. DEPARTMENT OF AGRICULTURE
BEFORE THE SENATE
SUBCOMMITTEE ON WATER AND POWER OF THE
COMMITTEE ON ENERGY AND NATURAL RESOURCES
ON
S. 752, AMENDMENTS TO THE
COLORADO RIVER BASIN SALINITY CONTROL ACT OF 1974,
PUBLIC LAW 93-320
SEPTEMBER 15, 1983

Introduction

Mr. Chairman and members of the subcommittee, I am Richard D. Siegel, Deputy Assistant Secretary for Natural Resources and Environment, U.S. Department of Agriculture (USDA). On behalf of USDA and Secretary Block, I would like to express our appreciation for the opportunity to appear before your subcommittee along with representatives from the Department of the Interior (DOI)to discuss the Administration's position on the proposed amendment to the Colorado River Basin Salinity Control Act, S. 752. We will limit our comments to the portions of the bill affecting USDA and will defer comments on the remainder of the bill to the Department of the Interior. The Department recommends enactment with amendments of the portion of S. 752 affecting USDA.

Before commenting on the specifics of the legislation, I would like to provide an explanation of the salinity problem and of prior efforts by the Federal Government to address it.

The Salinity Problem

At the headwaters of the Colorado River in Colorado and Wyoming, salinity averages about 50 milligrams per liter (mg/l). As the waters move downstream through the river system, salinity increases to an average annual concentration of 820 mg/l at Imperial Dam just north of Yuma, Arizona.

The intense use of the river waters for a variety of purposes reduces the river's overall flow, aiding the increase of salt concentration as the river moves downstream. While most salinity in the Colorado River results from natural phenomena, about 37 percent of the salinity results from irrigated agriculture. Waters used for irrigation evaporate, leaving concentrations of residual salts. Irrigation return flows return this salty water to the river. Other irrigation water percolates downward into the saline shale subsoil layer below the root zone and then returns in a salty state to the river. These conditions both occur above Imperial Dam.

Below Imperial Dam, the principal agricultural cause of salinity has been the return flow of irrigation water from the Wellton Mohawk Irrigation and Drainage District. As a result, in the late 1960's and early 1970's, salinity concentrations of the river where it entered Mexico below Imperial Dam reached 1,300 mg/l.

Damages from salinity affect agricultural and nonagricultural users in both the upper and lower Colorado River Basin areas and in the Los Angeles area which receives diverted water. Salinity in irrigation water drawn from the Colorado River leads to a continued build-up and increase of soil salinity which eventually restricts the types of crops grown and suppresses crop yields. Agricultural producers then move to growing alternate crops of lesser cash values, such as barley, instead of fruits and vegetables. In cases of severe soil salinization, farms may lose all production potential in certain fields.

Nonagricultural damages are experienced by a broad range of industrial users and by users of municipal water supplies. Major damage to municipal water supply systems is occurring in the Lower Colorado River region and in systems outside the drainage which receive diverted water. Increases in salinity levels harden the water, requiring use of more soaps and detergents. Salinity causes corrosion and scaling of water pipes and heaters, accelerates fabric wear, and increases water-softening costs. Industrial use damages include the need for water softening, demineralization, and in some cases, chlorination of industrial cooling systems to eliminate corrosion and mineral deposits. In many cases, industries need to pretreat their processing waters for transporting, mixing, washing, and cooking operations. Salinity levels in cooling waters also affect the rate of scale formation on heated surfaces and the quality of steam produced.

Prior Efforts of the Federal Government

The United States has had a long-term working relationship with Mexico with regard to the Colorado River. On February 3, 1944, the United States and Mexico signed the "Treaty for the Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande." The treaty, commonly referred to as the Mexican Water Treaty of 1944, allotted to Mexico 1,500,000 acre-feet annually of the waters of the Colorado River. As irrigation developments in the United States portion of the drainage subsequently expanded, water quality problems from increased salinization developed. Mexico formally protested these increasing salinity levels in the Colorado River. In 1972, the President named a special representative, former Attorney General Herbert Brownell, to develop a permanent, definitive solution to the salinity problem in the Colorado River.

Eventually, Minute No. 242 of the International Boundary and Water Commission was developed. In essence, Minute 242 provides that the total dissolved solids (salts) in the Colorado River waters delivered to Mexico cannot exceed those of the U.S. waters diverted from the river at Imperial Dam near Yuma, Arizona, by more than 115 ppm ±30. It is appropriate to note that since the signing of Minute No. 242 in 1973, the quality of waters delivered to Mexico has consitently been in compliance with the terms of that Minute.

In 1974, Congress enacted the Colorado River Basin Salinity Control Act, Public Law 93-320. Title II of the Act assigned the responsibility for salinity control projects both to USDA and to DOI. The 1974 Act directed the Secretary of the Interior, working in conjunction with USDA and EPA, to investigate, plan, design, and install certain authorized projects that would address salinity problems in the Colorado River Basin. Title I deals specifically with maintaining appropriate salinity levels for Colorado River flows to Mexico below Imperial Dam. It authorizes, for the Wellton-Mohawk Irrigation and Drainage District, an onfarm salinity control project. Title II of the Act relates to controlling salinity above Imperial Dam. Two projects underway under Title II are in Grand Valley, Colorado, and in the Uinta Basin, Utah. The Act instructs the Secretary of Agriculture to use existing authorities and USDA programs to cooperate with DOI and EPA in the salinity control effort. Through the Bureau of Reclamation, DOI has continued to plan and implement salinity control projects for various point and diffuse sources and agricultural irrigation sources of salinity. In units which have been established to control salinity originating from irrigation activity, the Bureau concentrates on off-farm efforts, such as lining primary canal and lateral delivery systems. USDA activities, however, concentrate upon onfarm improvements to the irrigation system and to irrigation water management.

The work authorized by P.L. 93-320 has a close connection with the Clean Water Act of 1972, P.L. 92-500. The Clean Water Act programs and authorities have been used since 1970 to address water quality in the Colorado River. The seven basin States have jointly agreed that salinity is a basinwide problem and developed mainstem standards for the river with the approval of EPA. USDA, DOI, and EPA all have cooperated with the seven basin States under both these laws.

USDA Involvement

Mr. Chairman, at this point I request that a copy of the 1982 USDA Annual Report on the Colorado River Basin Salinity Control Program be entered in the record of these hearings. Through agencies such as the Soil Conservation Service (SCS), Agricultural Research Service (ARS), Extension Service (ES), Cooperative State Research Service (CSRS), and Agricultural Stabilization and Conservation Service (ASCS), USDA has played a major role since 1974 in formulating, developing, and implementing an effective approach to reducing salt loads contributed to the Colorado River from onfarm irrigated agricultural croplands and related farm laterals and irrigation canals.

To date, USDA activities have included salinity control studies and implementation reports, continued research, demonstration and education, plus supplying technical and financial assistance to farmers and irrigation districts in the Grand Valley, Colorado, and Uinta Basin, Utah, salt source control units.

SCS has conducted detailed salinity control studies on priority irrigation salt source areas within the river basin. Within the 17 identified salt source areas, there are approximately 1 million acres of irrigated cropland. Plans have been completed covering seven different project areas totaling over 500,000 acres in five different States. These are Grand Valley (Colorado), Uinta Basin (Utah), Big Sandy (Wyoming), Moapa Valley (Nevada), Lower Gunnison and McElmo Creek (Colorado), and Virgin Valley (Nevada, Arizona). The seven completed plans project a combined average annual salt load reduction of over 750,000 tons once the plans have been fully implemented. This translates into an estimated 93.7 mg/l reduction at Imperial Dam.

Three more salt source areas are slated for planning: Price-San Rafael (Utah), Upper Virgin River (Utah), and Mancos Valley (Colorado). They would bring the total salt reduction to 898,000 tons per year. These projects account for 80 percent of agricultural caused salinity. These projects would cost USDA $369.7 million to complete by the year 2000.

Since 1979, SCS and ASCS have been supporting implementation of the Grand Valley and Uinta Basin project plans by supplying technical assistance and cost-share funds. In 1982, SCS estimated the average salt load reduction to be 12,850 tons per year for the Uinta Basin and 17,700 tons for the Grand Valley. In addition, in Grand Valley, USDA has worked very closely with the Bureau of Reclamation as it planned and installed major canal and lateral lining improvements in the Stage I project area. Initial Bureau monitoring shows the effect of this USDA-Bureau program on salt load reductions to be about 9,000 tons per year in Stage I.

These efforts have demonstrated clearly that the long-term objective of substantial salt load reduction requires a combination of structures and onfarm practices. Coordination between USDA and DOI must be maintained. The individual programs of either agency alone will not ensure an adequate level of salinity reduction.

Need for New Legislation

However, based on its experience with the Colorado River Salinity Control Programs since 1974, the Department of Agriculture has concluded in addition that its existing programs are an unwieldy framework for the action needed to deal effectively in the future with salinity control in the Colorado River Basin. The Department has no single legislative authority to provide financial assistance, technical assistance, and education. Instead, the USDA must use separate authorities in combination: the Agricultural Conservation Program (ACP) for cost-sharing assistance, the Conservation Technical Assistance and the River Basins programs of the Soil Conservation Service, and the Extension Service. Each of these separate programs operates with its own restrictions, and each program is awarded funds by its agency on a separate scale of priorities. These separate programs, with their various restrictions, are not well suited for dealing with the unique and complicated problems of multi-State salinity control requiring interagency and interdepartmental cooperation. Existing authorities were provided by Congress to accomplish specific objectives other than Colorado River salinity control. The Department badly needs a single Colorado River salinity line item that would allow for program balance and efficiency and to overcome the limitations imposed by features of existing authorities.

One limitation, for instance, of the present reliance on the ACP is the lack of authority to cost share with irrigation districts, canal companies, and other entities that are not agricultural producers. ACP funds by law may be awarded only to agricultural producers. This becomes a limitation in the salinity control effort where direct dealings with irrigation districts often would offer the most effective solution.

The annual payment restriction under ACP, currently set at $3,500 per participant, is another limitation for effective salinity control onfarm work. This maximum is not enough to cover the full cost-share on most irrigation and salinity control systems. It forces work to be stretched out over several years, when the same work could be completed in one year under more flexible cost-share rules. This leads to duplication of effort and higher cost. If a landowner wishes to see the work completed in one season, he is put into the position of financing the bulk of the work himself and then waiting year-by-year for his cost-share payments.

President Reagan's budget for USDA for fiscal year 1984 requested $12.5 million for onfarm salinity control in a single separate account. However, since no authorizing legislation was in place, the Appropriation Committees did not act on this request. The Administration has now submitted such legislation, but the USDA portions of S. 752, if amended as indicated, provide a useful alternative vehicle for providing the new authority that the Department desires.

New Legislation

Section 202(c) of S. 752 would provide authority to the Secretary of Agriculture to establish a voluntary onfarm salinity program for the enhancement and protection of the quality of water available in the Colorado River for use in the United States and the Republic of Mexico. The bill, if enacted, would authorize the Secretary of Agriculture to (1) identify salt source areas, (2) develop plans for implementing measures to reduce the salt load of the Colorado River, (3) provide technical and cost-sharing assistance, (4) conduct monitoring and evaluation, and (5) carry out research, demonstration, and education activities.

We believe Section 201(b) of S. 752 that requires preference be given based on cost-effectiveness is an important principle that will be helpful in budget coordination. This provision will allow USDA and DOI to develop cost-effectiveness criteria and budget crosswalk procedures to identify the more cost-effective units. This information will be the basis for developing annual funding proposals for Colorado River Salinity Control activities. Consolidated and coordinated budget formulation would permit more efficient program management.

The onfarm program would provide incentive payments and include increased technical assistance, as well as expanded research, education, and monitoring activities. If S. 752 or comparable legislation were enacted, the Department would set projectwide or subunit incentive levels based upon a weighting of onfarm and offsite benefits accrued as a result of the onfarm salinity control activities. Different levels may well be appropriate for and within subunits of individual salt source units.

Amendments

We are proposing six amendments to S. 752, which are likewise embodied in the separate bill, S. _____. The first substantive amendment concerns Subsection 202(b)(4). This provision would require the Advisory Council to request, and the Governor to concur, that onfarm measures to mitigate loss of wildlife values be included in a project plan. In dealing with past onfarm salinity control activities, mitigation has often been handled on an individual case-by-case basis, utilizing the same principles articulated in Subsection 202(b)(4)A-D. The restrictions imposed by the request/concurrence process would be viewed as a quasi-regulatory approach and as such would be contradictory to a local voluntary program. This subsection, as written, would also place the Advisory Council and the Governor in a position to exercise control over expenditure of Federal funds. We strongly oppose this role for them in this context for reasons outlined below and would propose to continue voluntary onfarm wildlife and wetland mitigation efforts. Our amendment would delete the reference to Subsection 202(b)(4) found in Subsection 202(c)(2)(B).

Our second substantive amendment addresses Section 202(c)(3), which would afford veto power to committees of the Congress, the Advisory Council, and the involved Governor over Executive Branch actions. Under the Supreme Court's recent decision in INS v. Chadha, 51 U.S.L.W. 4907 (June 23, 1983), Committees of the Congress may not be granted power to take action that affects in any way the legal rights or obligations of persons, including executive branch officials. Because this provision would purport to give such power to committes of the Congress, it is unconstitutional under the Chadha case.

In addition, the provisions for veto of a report by the involved governor or the advisory council, although not without precedent in Federal statutes, raises constitutional issues that have never been adjudicated definitively by the courts. In order to avoid such litigation, and because we believe this provision is unnecessary, it should be stricken.

The last sentence of the subsection would require a programmed implementation period of 10 years, which would establish fixed outyear costs and reduce flexibility in establishing appropriation levels. Instead, we propose to use the projected USDA long-term implementation schedule, which may be modified from time to time as fiscal resources permit and as new program information becomes available. Therefore, we recommend deleting from Section 202(c)(3) all references to disapproval of expenditures by Congress, the Advisory Council, and the Governor, as well as the reference to a 10-year program completion period.

Finally, we have concerns with Subsection 202(c)(4) of the bill, which provides for specific year-by-year funding levels. These figures assume a full 10-year implementation program by salt source area. The Secretary of Agriculture should be allowed to authorize implementation on a critical area basis and should have the flexibility to choose subbasins within a salt source area for implementation. Such flexibility would allow shorter time frames for implementation and would allow outyear resources to be geared to the national economy's state of health. We recommend substitution of appropriate language on this portion of the bill. We also are concerned that the borrowing

28-181 O - 84 - 8

authority of the Commodity Credit Corporation not be used for the purposes of this Act, and would insert an appropriate provision to ensure this. Language appropriate for accomplishing both of those objectives is attached at the end of my statement. Finally, there are three remaining amendments of a technical and editorial nature which are set out in the legislative report of the Department of Agriculture.

Conclusion

Since 1974, the Colorado River Salinity Control Program has become increasingly critical. There are regional, national, and international benefits to be achieved through this program. The United States has a commitment regarding salinity concentration levels agreed to with Mexico in Minute 242 through the International Boundary and Water Commission.

The combined local, State, and Federal efforts that would be authorized by the enactment of S. 752, if amended as indicated, or S. _____ will help make better use of the very limited water resources available in the water-short Colorado River Basin. Water will be conserved through efficiencies in irrigation and water management. Agricultural productivity will be improved by economies in irrigation and reduced salinity in waters used for irrigation. Water quality will improve by reduction of the deep percolation of water on farms that causes so much salinity. Thus, the benefits from a stronger salinity program will affect both water quantity and quality.

We strongly support the enactment of the agriculture portions of S. 752 with the amendments we have suggested. We defer to the Department of the Interior for comments on the remainder of the bill.

United States Department of Agriculture

Soil Conservation Service

Washington, D.C.

In consultation with

USDA Salinity Control Coordinating Committee

1982 Annual Report Colorado River Basin Salinity Control Program

FOREWORD

The Colorado River Basin Salinity Control Act of June 24, 1974, (Public Law 93-320) provides for the enhancement and protection of the quality of water available in the Colorado River for use in the United States and Mexico. This 1982 Annual Report on the Colorado River Basin Salinity Control Program (CRBSCP) has been prepared to explain the progress, the activities, and the salinity control accomplishments achieved by the U.S. Department of Agriculture (USDA) program. USDA has continued to maintain reasonable progress with implementation of onfarm irrigation improvement and salinity control under authority of existing programs. However, with modest funding increases and legislative authority to establish a separate USDA onfarm salinity control program for the Colorado River Basin, USDA feels further improvements in the program may be achieved in the years ahead.

I. Executive Summary 1

II. Introduction 3

A. General 3

B. The Colorado River Basin 3

C. The Salinity Problem 3

D. Colorado River Basin Salinity Control Act 6

E. Benefits 7

III. USDA Title I Activities (Wellton-Mohawk, AZ) 8

IV. USDA Title II Activities 12

A. Irrigation Salt Source Area Studies 12

B. Implementation - Technical Assistance and Cost-Sharing, Grand Valley, Colorado and Uinta Basin, Utah 12

C. Extension Education 17

D. Research and Demonstration 18

E. Monitoring and Evaluation 19

V. Institutional and Interagency Coordination 21

VI. Funding and Budgeting 23

VII. Legislative Activities 26

VIII. Projected 1983 Activities 27

I. EXECUTIVE SUMMARY

This 1982 USDA Annual Report on the CRBSCP presents an abbreviated overview of the many activities addressed during the past year. The report serves as an informational document which explains USDA accomplishments during 1982 and identifies some key activities projected for 1983. It is intended that this annual report receive widespread distribution to USDA agencies, U.S. Department of the Interior (USDI) agencies, U.S. Environental Protection Agency (EPA), the Advisory Council, the Forum, and other cooperating agencies or interest groups.

Overview

1. Average annual salinity concentrations of the Colorado River increase progressively as it flows downstream from about 50 milligrams per liter (mg/l) in the headwaters to about 820 mg/l at Imperial Dam. Without upstream salinity control, concentrations are projected to reach about 1140 mg/l by the year 2000.

2. Irrigated agriculture contributes 37 percent of the total annual salt load to the Colorado River above Hoover Dam.

3. Average annual downstream damages for each mg/l increase in salinity at Imperial Dam costs approximately $513,000 (January 1982). Therefore, each ton of salt load reduction provides about $50.00 worth of average annual benefits.

Title I Wellton-Mohawk

1. The Wellton-Mohawk project objectives are to reduce average annual return flows to 108,000 acre feet per year. The 1981 return flows were 153,000 acre feet and are projected to be reduced to 108,000 acre feet by 1986.

2. Plans and contracts have been executed on 237 farms covering 33,600 acres out of 327 applications for 52,600 acres in the Wellton-Mohawk project. Complete irrigation water management and application have been achieved on 26,400 acres.

Title II

1. The McElmo Creek (CO) and Virgin Valley (NV, AZ) irrigation salinity control studies were completed in 1982 making a total of seven completed studies.

2. In the Grand Valley, the Agricultural Stabilization and Conservation Service (ASCS) received 297 requests for cost-sharing in 1982 with SCS servicing 228 applications. There were 185 who completed at least one or more water management and salinity control practices. Over 1,400 separate requests have been received with nearly 900 participants applying at least one practice since 1979.

3. The Soil Conservation Service (SCS) has developed 195 irrigation water management plans in Grand Valley on 5,473 acres.

4. In the Uinta Basin, 313 long term agreement (LTA) requests have been received on 32,892 acres. A total of 162 contracts on 17,501 acres have been signed.

5. For 1982, the Grand Valley project achieved an estimated salt load reduction of 17,700 tons per year for a 1.84 mg/l reduction of salinity at Imperial Dam. The Uinta Basin achieved a reduction of 12,850 tons per year for a 1.34 mg/l reduction at Imperial Dam.

6. The Agricultural Research Service (ARS) activities include research on use of saline or brackish water on salt tolerant crops, electromagnetic soil salinity probe, level basins, and new automated "cablegation" irrigation systems. Two successful cablegation systems have been installed in Grand Valley.

7. Funding levels for 1983 will continue at about the same rate as 1982; however, ARS has received a $600,000 increase for expanded Colorado River salinity control research.

8. FY-84 funding proposes a USDA consolidated account and requests budget increses for expanded implementation.

9. S.2202 has been reintroduced as S.752 and HR 6097 has been reintroduced as HR 2790. It is anticipated that this legislation will provide the necessary legislative authority for a special USDA onfarm salinity control program.

10. The 1983 activities will include present efforts, plus new initiatives in: 1) monitoring and evaluation; 2) legislative authorities; 3) funding; and 4) program rules and regulations consistent with national soil and water conservation objectives.

II. INTRODUCTION

A. General

USDA involvement in the CRBSCP started in the early 1970's. As the United Sates and Mexico began to deal with the international problem of increased salinity concentrations in the Colorado River in the late 1960's, it became increasingly evident that much of the problem (and subsequently much of the solution) was associated with irrigated agricultural lands. Because of the extensive experience, knowledge, and technical expertise in agricultural irrigation, USDA's eventual involvement in addressing the Colorado River salinity problems was inevitable. USDA has become increasingly involved in a somewhat evoluntionary process. Initially, USDA participation was regarded more as consultive and supportive to the salinity control initiatives of USDI and the program leadership of the U.S. Bureau of Reclamation (BR). As the causes of salinity problems became more clearly defined and the solutions to salinity control were more clearly identified, it became clear that onfarm agricultural salinity control would be very cost-effective, and a logical solution to solving a major part of the salinity problem.

B. The Colorado River Basin

The Colorado River Basin encompasses portions of seven States: Colorado, Wyoming, Utah, Nevada, New Mexico, California, and Arizona. (See Figure II-1). The river is 1,400 miles long, with its headwaters in Wyoming and Colorado. It empties into the Gulf of California and serves some 14.5 million people on its way. It is one of the most physically developed and regulated rivers in the Nation. In 1964, the waters were totally consumed and flows no longer reached the Gulf of California.

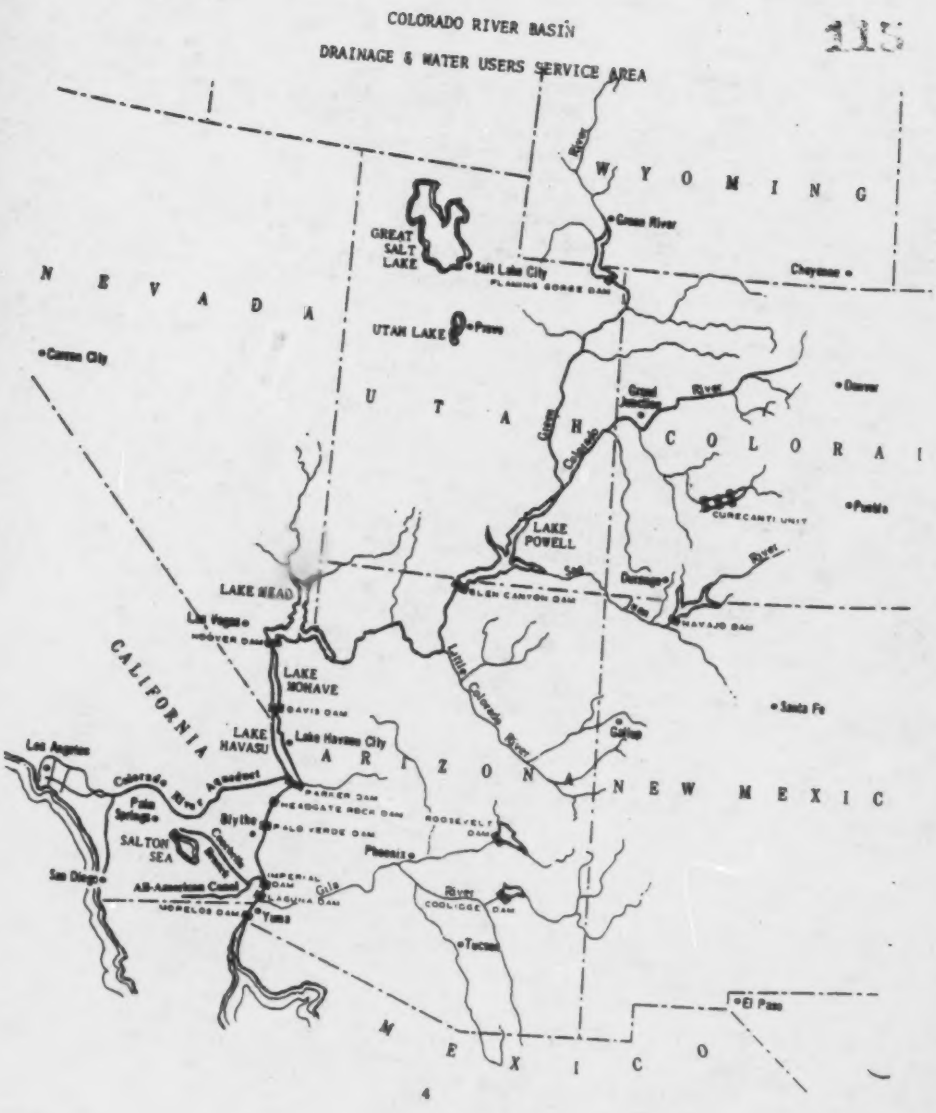
The river flow is apportioned among Upper and Lower Basin States and the Republic of Mexico. There are some 2.6 million acres of private irrigated cropland and some 44 million acres of nonfederal forest and rangeland within the United States' portion of the Basin.

Because waters of the Colorado River serve as the primary life-line for much of the seven Basin States, there are many different uses for the Colorado River. Irrigation water is the major use; however, many municipal and industrial users are dependent upon Colorado River water. There are numerous hydro-electric power plants on the Colorado River. Therefore, the Colorado River goes through a continuous use and reuse cycle which involves irrigation, hydro-electric power, and municipal and industrial uses.

C. The Salinity Problem

Salinity problems in the arid and semiarid areas of the United States are a critical concern to those involved in the management of our natural resources. The salinity problem can take two forms. One is salinity buildup in the soil root zone that reduces or precludes an economic return from growing agricultual crops. The other is excessive salinity in groundwater, lakes, streams, and rivers that reduces or precludes their use for irrigation, domestic, municipal, and industrial water supply or for fish and wildlife habitat. Specialists agree that improved irrigation management, in most circumstances, offers an effective approach towards reducing the contribution to salinity in river systems from irrigation. Frequently, it is the most cost-effective option available.

Figure II-1


COLORADO RIVER BASIN
DRAINAGE & WATER USERS SERVICE AREA
WYOMING
NEVADA
UTAH
COLORADO
ARIZONA
NEW MEXICO
CALIFORNIA
MEXICO
GREAT SALT LAKE
Salt Lake City
Green River
Cheyenne
UTAH LAKE
Provo
Carson City
Denver
Grand Junction
Colorado River
CURECANTI UNIT
Pueblo
LAKE POWELL
GLEN CANYON DAM
San Juan River
Durango
NAVAJO DAM
LAKE MEAD
Las Vegas
HOOVER DAM
LAKE MOHAVE
DAVIS DAM
LAKE HAVASU
Lake Havasu City
Little Colorado River
Gallup
Santa Fe
Los Angeles
Colorado River Aqueduct
PARKER DAM
Palm Springs
Blythe
HEADGATE ROCK DAM
PALO VERDE DAM
ROOSEVELT DAM
SALTON SEA
Coachella Canal
Phoenix
San Diego
All-American Canal
IMPERIAL DAM
LAGUNA DAM
Gila River
COOLIDGE DAM
MORELOS DAM
Yuma
Tucson
El Paso

As salinity concentrations increase, the damages and impacts become more severe. For irrigated agriculture, salinity levels of 500 to 700 mg/l begin to have a detrimental impact on net returns. Higher salinity levels create increased operating costs, supressed crop growth, and ultimatley adversely effects yields. As salinity concentrations exceed 700 mg/l, the cross-section of salt tolerant crops becomes more restricted and limiting. Normally salt tolerant crops do not provide as favorable an economic return that the more salt sensitive crops do. Salinity levels in excess of 1000 to 2000 create severe crop production problems because of the need for specialized and extremely costly irrigation management practices.

With the maximum safe drinking standard set at 500 mg/l, salinity concentrations of over 500 mg/l also becomes costly for municipal, industrial, and residential homeowners to treat. The increased salinity concentration also has a corrosion and deteriorating effect on pipelines and home appliances.

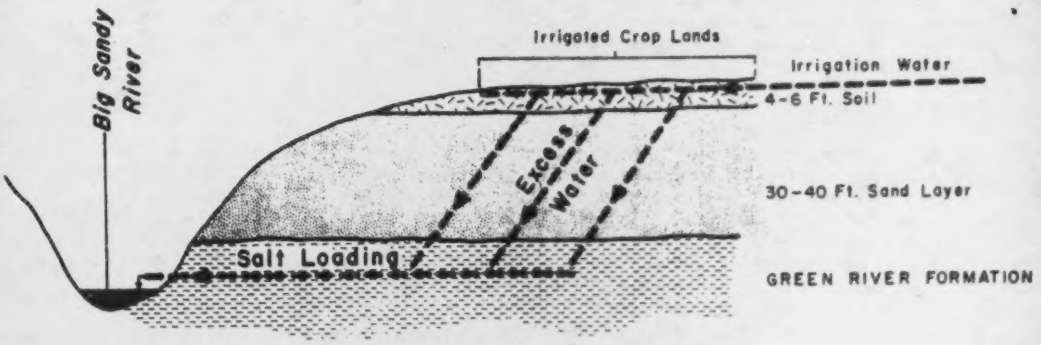
Within the Colorado River, increased salinity levels are caused by two different processes: 1) salt concentrating; and 2) salt loading. The "salt concentrating process" essentially involves the loss of waters by reservoir evaporation, export, and by evapo-transpiration of irrigated crops. As excess waters are evaporated and used by the plants, residual salts are left behind to concentrate in the soil and/or remaining waters. The "salt loading process" occurs as seepage and deep percolation dissolves mineral salts in the surface soils and highly saline geologic formations as it returns to the river system. As additional salts are picked up, the total salt burden or load carried by the river increases. Figure II-2 provides a good example of the salt loading process from over-irrigation in the Big Sandy irrigated area.

In 1962, the salinity of the water delivered to Mexico increased from an annual average of about 800 mg/l to nearly 1,500 mg/l. This was primarily attributed to the highly saline drainage return flows from the Wellton-Mohawk Irrigation and Drainage District area, which empties into the Colorado River below Imperial Dam, and partially to the concentrating effects and salt loadings from upstream water development.

The total salt load in the river entering Lake Mead above Hoover Dam is estimated to average 9 million tons per year. To meet the salinity control objective of the Colorado River Basin Salinity Control Act, it is necessary to remove some 2.8 million tons of this salt load per year. The present average annual salinity concentration of the river varies from about 50 mg/l in the headwaters to about 820 mg/l at Imperial Dam. The USDI projects a future salinity level of 1,141 mg/l at Imperial Dam for the year 2000 as additional upstream development takes place, assuming no corrective action is taken. The long-term average annual salinity concentration at Imperial Dam is 875 mg/l under current development conditions. Each mg/l increase in salinity concentration at Imperial Dam causes approximately $513,000 per year (1982 dollars) in economic damages to downstream agricultural, municipal, and industrial water users within the United States. It has been estimated that irrigation contributes about 37 percent of the total salt load to the river above Hoover Dam. Natural sources contribute 47 percent with reservoir evaporation (12 percent), exports (3 percent), and municipal and industrial use (1 percent) contributing the balance.

Average onfarm irrigation and distribution system efficiencies, especially in the Upper Basin, are generally low. Low irrigation efficiencies generally indicate high surface runoff and/or over-irrigation. Over-irrigation can result in excessive deep percolation which leaches salts from the soil into the river. This greatly contributes to the salinity problem.

Figure II-2 The Salt Loading Process



SOURCE OF SALT LOADING

There are approximately 1 million acres of irrigated cropland in 17 identified salt sources units in the Colorado Basin. Ten of these units are presently considered feasible salinity control projects and would involve treatment on nearly 700,000 acres of irrigated cropland upon full implementation.

D. The Colorado River Basin Salinity Control Act

Salinity Control in the Colorado River Basin is addressed in the Colorado River Basin Salinity Control Act of 1974, Public Law 93-320. The Act has two major sections. Title I of the Act relates to maintaining the water quality (salinity concentrations) standards which the United States agreed to on August 30, 1973, in Minute 242 of the International Boundary and Water Commission for water delivered to Mexico under the Mexican Water Treaty of 1944. This section relates to a program for improving irrigation efficiencies and reducing highly saline irrigation drainage return flows from the Wellton-Mohawk Irrigation and Drainage District. Title I also authorizes the USDI to proceed with the design and construction of a large desalinization plant to treat excess irrigation drainage return flows from the Wellton-Mohawk area.

Title II of the Act deals specifically with the salinity concentrations in the Colorado River above Imperial Dam, and the controls necessary to meet United States water quality (salinity concentration) standards established by the seven basin States and the EPA. The Secretary of Interior was authorized to undertake various investigations and studies to determine the nature of salt loading problems, potential salinity control solutions, and costs. The Secretary also received authorization to proceed with construction of certain salinity control projects.

More importantly, the Act instructed the Secretary of Interior "to coordinate and cooperate with the Secretary of Agriculture and the Administrator of the EPA" regarding diffuse and non-point source areas of salinity. Title II further instructed the Secretary of Agriculture to use "existing programs" available to that Department to assist with salinity control.

USDI assigned leadership responsibilities for the Act to the BR, and USDA assigned program leadership to the SCS. USDA's involvement is documented in a 1974 Memorandum of Understanding with USDI and in a 1975 Memorandum of Agreement between the SCS and the BR.

E. Benefits

Benefits related to water quantity, water quality, and reduced salt loadings are major factors in the onfarm salinity control projects. Completed reports indicate onfarm irrigation efficiency improvements and salinity control practices will reduce salt loads by 19,000 tons per year in Moapa Valley and to as much as 335,000 tons per year in Lower Gunnison. Table II-I shows the salt load reductions and salinity concentration reduction impacts at Imperial Dam for six onfarm salinity control projects. USDA has not recommended a plan for the Big Sandy unit because of the continued off-farm salinity control planning being conducted by the BR.

Table II-I - Salinity Control Impacts at Imperial Dam for Recommended Plan

Irrigation Unit Areas	Salt Load Reduction (Tons)	Reduced Salinity Concentration (mg/l)
Grand Valley (CO)	230,000	24
Uinta Basin (UT)	76,000	10
Moapa Valley (NV)	19,000	2
Lower Gunnison (CO)	335,000	35
Virgin Valley (NV, AZ)	37,000	4
McElmo Creek (CO)	38,000	4
Big Sandy (WY)	No Recommended Plan	

These reductions provide significant water quality benefits based upon $513,000 average annual downstream damages for each mg/l increase in salinity concentration at Imperial Dam.

The major benefits from the CRBSCP are national and regional in scope. The national need is to maintain the salinity differential in the Colorado River water delivered to Mexico in accordance with the 1973 agreement (Minute No. 242 of the International Boundary and Water Commission, United States and Mexico). The regional need is to maintain current salinity levels in Colorado River water withdrawn for downstream use while allowing the Basin States to further develop its compact-apportioned waters.

III. USDA TITLE I ACTIVITIES

USDA activities under Title I of the Colorado River Salinity Control Act are primarily related to improving irrigation efficiencies, reducing deep percolation, and reducing highly saline irrigation and drainage return flows from the 65,000 acre Wellton-Mohawk Irrigation and Drainage District in Yuma County, Arizona. As farmers over-irrigate, excess and unused irrigation waters percolate down through the soil profile creating a high water table enriched with high salinity levels. To overcome the agricultural production problems caused by salinity build-up and poor drainage, pump-drainage wells are used to lower the saline high water tables. This "pumped" drainage water, with salinity concentrations ranging from 3,000 to 6,000 parts per million (PPM), is then removed from the Wellton-Mohawk area through drainage canals and ditches discharging into the Colorado River. These highly saline return flows then cause increased salinity concentrations in the Colorado River waters delivered to Mexico. This highly saline drainage return flow created the downstream salinity problems for Mexico in the 1960's which led to Minute No. 242, and the passage of Public Law 93-320, the Colorado River Basin Salinity Control Act.

In conjunction with the BR planning for the desalting plant authorized in Title I of the Act, an Advisory Committee on Irrigation Efficiency and a support Technical Field Committee on Irrigation Efficiency were created. The interagency committees were formed to develop alternatives to improve irrigation efficiencies and to reduce drainage return flows. This would ultimately reduce the size and costs of building and operating a large desalting plant. A 1974 "Special Report: Measures for Reducing Return Flows from the Wellton-Mohawk Irrigation and Drainage District" includes the specific recommendations for installing onfarm measures and technical assistance.

The recommended onfarm program essentially included structural onfarm improvement measures, technical assistance through SCS, and Federal cost-share through individual conservation plans and long-term contracts. The initial program established in 1974 included irrigation system improvements and water management on 23,800 acres in a five-year period. Recommended cost-sharing was established at 75 percent Federal and 25 percent landowner or farm operator. The combined impact of the USDA onfarm program, the BR Irrigation Management Scheduling program, and the BR 10,000 acre acreage reduction program were projected to increase district-wide irrigation efficiencies from 55 percent up to 72 percent. Drainge return flows were also projected to be reduced from approximately 200,000 acre-feet per year down to 136,000 acre-feet.

In 1979, the Technical Field Committee on Irrigation Efficiencies recommended the onfarm program be expanded to include treatment on an additional 19,000 acres with all other irrigation lands being eligible for a water management plan. The Advisory Committee's recommended implementation program to improve onfarm irrigation efficiencies will further reduce return flows to 108,000 acre-feet per year. The implementation program is scheduled to continue through 1986.

The Wellton-Mohawk onfarm program is fully funded by the BR. Under authority of the USDI and USDA Memorandum of Understanding (November 1974) and a BR-SCS Title I Memorandum of Agreement (December 1974), the BR periodically reimburses the SCS for cost-sharing expenditures and technical assistance costs. The SCS enters into direct landowner or operator contracts to install conservation practices that contribute directly to the objectives of the

program. The contract is based upon irrigation water management plans developed with SCS technical planning assistance. The contract provides for technical and cost-share assistance on design and installation of water management practices. There are provisions for irrigation water management efficiency compliance checks over a two-year period following installation of practices.

The SCS establishes planning and implementation priorities to more effectively use the resources allocated to the program. Priorities are established by considering current irrigation efficiencies, crops grown, adequacy of onfarm systems, and soil characteristics. Lands with greatest potential for increasing efficiencies and decreasing drainage return flows receive highest priorities. All plans and SCS contracts are reviewed and approved by the governing Board of Supervisors for the Wellton-Mohawk Valley Natural Resource Conservation District.

Figure III-1, Wellton-Mohawk Applications, Contracts, and Treatments (acres by year) shows the overall progress since the program was initiated. Figure III-2, Wellton-Mohawk Applications and Plans/Contracts (numbers by year) also reflects the annual number of participants assisted.

As of 1982, 327 applications for assistance on 52,600 acres were received. Irrigation water management plans and contracts have been developed on 237 farms covering 33,600 acres. Of these, 26,400 acres have been fully treated and are presently under a continuing irrigation water management program.

In 1982, 21 applications were received for 3,700 acres. Completed plans and contracts were signed on 30 farms covering 3,550 acres. All land treatment and water management improvement practices for salinity control were applied to 6,340 acres in 1982. Technical assistance for continued irrigation water management will be provided on these acres over the next two years as part of the follow-up program.

Table III-1 presents a summary of 1982 accomplishments and the total practices installed to date. Figure III-3 illustrates the downward trend in drainage return flows from 1975 through 1981. These downward trends can be attributed to the combined effects of the USDA onfarm program and the BR's acreage reduction program and Irrigation Management Services. It is interesting to note the initial 1974 return flow goal of 136,000 acre-feet per year has nearly been achieved and the 108,000 acre-feet revised goal established in 1979 should be achieved if the same downward trend continues through 1986. The slight annual increase in 1977 and 1980 are a result of increased drainage flows attributed to flooding influences of the Gila River.

Figure III-1

WELLTON–MOHAWK 1975–1982

APPLICATIONS, CONTRACTS AND TREATED (ACRES)

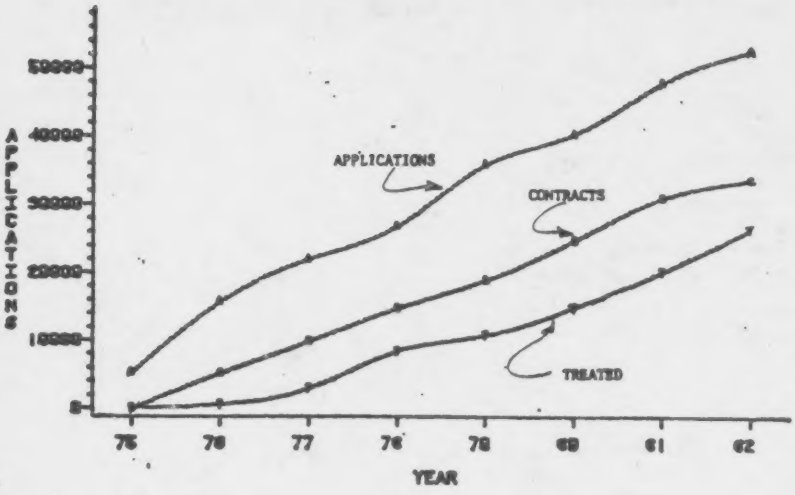


Figure III-2

WELLTON–MOHAWK 1975–1982

APPLICATIONS AND PLANS–CONTRACTS (NUMBERS)

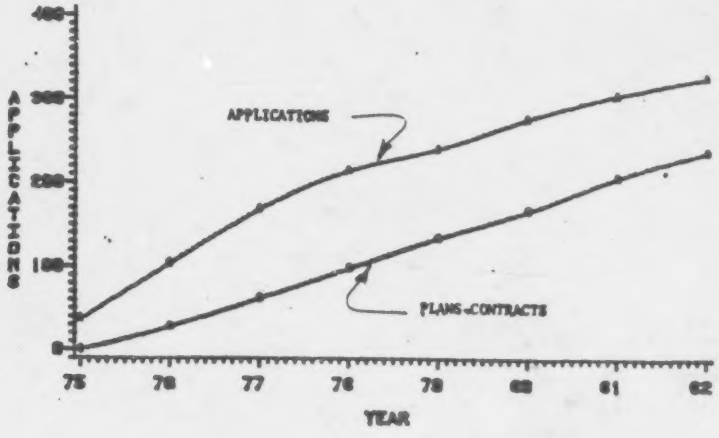


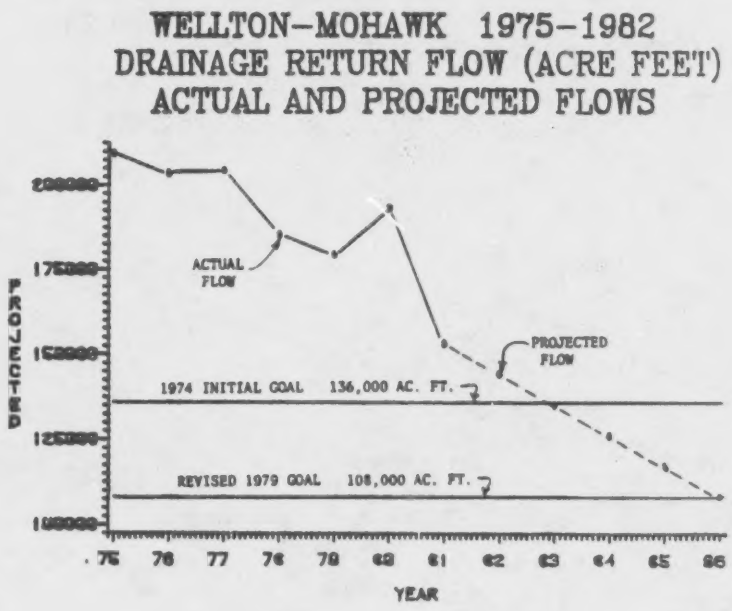
Table III-I

Practices Installed
SCS Onfarm Improvement Program
Wellton-Mohawk Irrigation and Drainage District

PRACTICES		1982	CUMULATIVE
1. Ditch Lining	(FT)	128,571	961,656
2. Land Leveling	(AC)	4,902	30,950
3. Structures for Water Control and Measurement	(NO)	1,012	7,136
4. Soil Improvement	(AC)	214	1,870
5. Pumping Plants	(NO)	0	10
6. Drip, Bubbler Irrigation Systems	(NO)	1	10
7. Vertical Underground Barriers	(FT)	7,877	14,505
Federal Cost	$	$ 2,117,401	$ 11,540,746
Nonfederal Landowner Cost	$	705,800	3,846,915
Total Cost 1/		$ 2,823,201	$ 15,387,661

1/ Excludes 1982 SCS technical assistance costs of $370,970 and total SCS technical assistance to date of $2,395,273.

Figure III-3


WELLTON-MOHAWK 1975-1982
DRAINAGE RETURN FLOW (ACRE FEET)
ACTUAL AND PROJECTED FLOWS
ACTUAL FLOW
PROJECTED FLOW
1974 INITIAL GOAL 136,000 AC. FT.
REVISED 1979 GOAL 108,000 AC. FT.
PROJECTED
YEAR
75 76 77 78 79 80 81 82 83 84 85 86

IV. USDA TITLE II ACTIVITIES

Title II activities include a broad range of USDA agencies inputs into the planning and implementation of an agricultural onfarm salinity control program.

Specific language in Title II of Public Law 93-320, the Colorado River Basin Salinity Control Act, directed the Secretary of Interior, the Administrator of the EPA, and the Secretary of Agriculture to "cooperate and coordinate their activities effectively to carry out the objectives of this title". In fulfillment of the legislative directive, the Secretary of Interior and the Secretary of Agriculture entered into a Memorandum of Understanding in November, 1974. A subsequent Memorandum of Agreement has been executed between the BR and the SCS, and, in addition, an internal USDA Memorandum of Agreement between various USDA agencies has been executed. The various activities and accomplishments of the USDA agencies are further explained in the remainder of this section. The major program areas addressed by the USDA agencies are: 1) irrigation salt source area studies (SCS); 2) implementation technical assistance (SCS); 3) implementation cost-sharing (ASCS); 4) extension eduction (ES); 5) research and demonstration (ARS, CSRS); and 6) monitoring and evaluation (SCS).

A. Irrigation Salt Source Area Studies

This activity is a planning function under leadership of SCS. The objectives of these studies are: 1) to identify salt source areas; 2) to determine salt loading estimates; 3) to evaluate treatment alternatives and salt load reduction impacts; and 4) to develop recommended implementation plans and associated implementation costs. These detailed salinity control studies and investigations are being funded using river basin study authorities of Section 6 of Public Law 83-566. Full coordination is maintained with the BR, the EPA, and interested State and local agencies or organizations through various coordinating committees at the local project level.

Table IV-1 presents the current status of the 17 identified irrigation salt source area studies. It is noted that the Virgin Valley and McElmo Creek studies were both completed in 1982; however, McElmo Creek was not published until February 1983. With publication of the Virgin Valley and McElmo Creek reports, USDA has completed seven salinity control studies on over 500,000 acres. If fully funded and implemented, these seven salinity control projects would reduce Colorado River salt loading by nearly 750,000 tons per year which translates into a reduction in salinity concentrations at Imperial Dam of 82.9 mg/l.

Salinity control planning activities for FY-83 will be somewhat minimal with only modest planning activities underway in the Price-San Rafael (UT) and the scheduled completion of Mancos Valley (CO). USDA anticipates adequate funding to resume a more intensive planning effort in FY-84. Other salt source areas with no anticipated study activities at this time either lack significant salinity control benefits or local support to initiate a planning study.

B. Implementation Technical Assistance and Cost-Sharing

In Public Law 93-320, the Secretary of Agriculture was directed "to cooperate in the planning and construction of onfarm system measures under programs available to that Department". Present USDA implementation projects are being carried out under authority of the existing SCS conservation technical assistance program and the ASCS Agricultural Conservation Program (ACP) cost-sharing authorities.

Colorado River Basin Sal...y Control Program
Irrigation Salt Source Unit Studies
Status Report

Area	Study Status	Impl. Start	Remarks
1. Grand Valley (CO)	Publ. - Dec. 1979	1979	Modified schedule extends implementation to 1993
2. Uinta Basin (UT)	Publ. - Jan. 1979	1980	Modified schedule extends implementation to 1994
3. Big Sandy (WY)	Publ. - Nov. 1980	1985	USBR off-farm and USDA onfarm alternatives being reassessed in conjunction with State of Wyoming
4. Moapa Valley (NV)	Publ. - Feb. 1981	1984	Pending implementation funding in FY-84
5. Lower Gunnison (CO)	Publ. - Sept. 1981	1986	Proposed to rescope implementation plan with priority areas and implementation phases
6. Virgin Valley (NV, AZ)	Publ. - March 1982	1984	Pending implementation funding in FY-84
7. McElmo Creek (CO)	Publ. - Jan. 1983	1992	Implementation extended to future years
8. Price-San Rafael (UT)	Underway-Scheduled 1984	1987	FY-83 planning suspended, will maintain USBR liaison, study to resume in FY-84
9. Upper Virgin (UT)	Temporary Suspension	1992	Study activities to resume pending funding in FY-84
10. Mancos Valley (CO)	Underway-Scheduled 1983	1995	Study wrapup in FY-83. Implementation extended to 1995 - subject to change
11. Little Colorado River (CO)	Publ. - Dec. 1981	—	No recommended plan or salinity control benefits identified
12. Colorado River Indian Reservation (AZ)	Underway-Scheduled 1984	—	General river basin study underway, no major salinity control benefits or implementation anticipated
13. Palo Verde (CA)	Inactive	—	Anticipate planning activities for FY-84 pending funding
14. Dirty Devil (UT)	Inactive	—	No anticipated activities at this time
15. Roaring Fork (CO)	Inactive	—	No anticipated activities at this time
16. Henry's Fork (WY)	Inactive	—	No anticipated activities at this time
17. Lyman (WY)	Inactive	—	No anticipated activities at this time

The SCS provides program leadership for technical assistance to individual landowners and operators. Major services that the SCS provides include assisting landowners in developing irrigation water management and salinity control plans, designing and installing irrigation improvement practices, and subsequent water management follow-up assistance with indiviudal irrigators to improve irrigation application techniques and assure proper maintenance. Because of the many complexities associated with irrigation water management and salinity control, and because of the high level of technical expertise needed to assist individual landowners, the entire technical assistance program demands a substantial workforce of fully trained technicians.

There also needs to be significant incentive for individual landowners to invest in sophisticated water management systems which essentially provide for off-site benefits to downstream users as opposed to providing major onfarm benefits. Because of the significant off-site or downstream benefits, a reasonable level of cost-sharing support is needed to encourage local landowners to participate. Using existing ACP authorities, the ASCS provides cost-sharing for the installation of water management practices and related off-farm lateral distribution systems. Cost-sharing may be provided through annual practices or through long-term agreements (contracts) based upon complete onfarm water management and salinity control plans.

Grand Valley, Colorado

The Grand Valley project was initiated in 1979 as the first onfarm salinity control project in USDA. The implementation program is tailored to the USDA salinity control report, "Onfarm Program for Salinity Control, Final Report of the Grand Valley Salinity Study," dated December 1977, and Supplement No. 1 issued in March 1980.

The initial plan called for the treatment of approximately 53,000 acres with such things as: 1) irrigation system improvements like concrete lining, pipelines, gated pipe, measuring devices and water control structures; 2) land leveling for more uniform irrigation application; and 3) irrigation water management practices such as regulating the length of run, time of set, flow rates, and frequency of irrigation necessary to reduce deep percolation.

Supplement No. 1 also included provisions for limited improvements of off-farm lateral distribution systems which are important to the delivery of irrigation water to the onfarm irrigation systems. The design and construction of off-farm laterals are an integral part of the onfarm improvement program. Improvements and redesign of more efficient off-farm delivery systems have to be compatible with the location, elevation, and flow rates for onfarm irrigation systems.

When fully implemented, the onfarm improvement program is estimated to reduce Colorado River salt loadings by 130,000 tons per year with an additional 100,000 tons per year being eliminated by related USDA off-farm lateral improvements.

In 1982, SCS created an irrigation water management (IWM) specialist position to devote more attention to the onfarm IWM follow-up program. As irrigation systems are improved, it become extremely critical that the farm operator (or irrigator) improve his irrigation techniques and minimize deep percolation to fully achieve the salt load reduction objectives of the program. It is the continued operation and maintenance of onfarm irrigation systems and improved irrigation water management which work toward reducing deep percolation and subsequntly reduced salt loads to the Colorado River.

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Under the ACP Program, ASCS received 239 individual requests in 1982. Of these, SCS serviced 228 with 185 completing one or more practices. Since 1979, over 1,400 separate requests for cost-share assistance have been received with nearly 900 participants actually completing an irrigation water management and salinity control practice. While the project relies heavily on annual ACP requests and practices, there have been 12 LTA's on 2,222 acres developed since 1979. Two LTA contracts on 135 acres were completed in 1982. The SCS has also assisted in the development of 48 IWM plans on 1,352 acres in 1982, bringing the total number of IWM plans to 195 on 5,473 acres. Actual IWM/salinity control practices applied in 1982 and cumulative to date accomplishments are presented in Table IV-2.

Table IV-2

Grand Valley Irrigation Water Managment
& Salinity Control Practices Applied

Practices	Unit	1982 1/	Cumulative
Off-farm Related Laterals			
Pipeline	Ft.	35,672	136,518
Ditch Lining	Ft.	1,607	56,241
Structures	No.	40	107
Onfarm Improvements			
Pipeline	Ft.	68,213	219,284
Ditch Lining	Ft.	37,750	127,252
Gated Pipe	Ft.	43,490	114,945
Land Leveling	Ac.	343	1,782
Structures	No.	50	130
Drip/Sprinkler Systems	No.	—	8

1/ 1982 Fiscal Year

The cumulative impacts of these practices and improved irrigation water management represent a 3,555 acre feet reduction in deep percolation per year with an equivalent salt load reduction of 17,700 tons per year. This salt load reduction translates into a 1.84 mg/l reduction in salinity concentrations at Imperial Dam.

Uinta Basin, Utah

The Uinta Basin salinity control project, initiated in 1980, is the second and only other Title II USDA onfarm program underway at this time. The project is being implemented consistent with "USDA Salinity Report, Uinta Basin Unit, Utah" published January 1979 and supplemented by a November 1980 Addendum. The implementation plan includes the installation of sprinkler systems on 79,000 acres and improved surface irrigation systems on 43,000 acres. Other associated water management practices are included in the land treatment phases of the project for salinity control. The total estimated salt load reduction estimates for the fully implemented Uinta Basin report is 76,600 tons per year.

Present technical staffing has increased to 17 in 1982. Of these, there are two biologists, seven soil conservationists, three engineers, and three soil conservation technicians. Major technical assistance emphasis has been given to developing complete IWM plans as a basis for long-term agreements, to design and install water management practices, and to onfarm IWM follow-up.

The implementation strategy for the Uinta Basin was to target salinity control planning and application to priority areas within the project. The initial USDA salinity control study looked at nine different evaluation units and treated each area as a separate subunit to the entire Uinta Basin. As implementation started in 1980, the Dry Gulch area was identified for priority assistance. Since then implementation focus has been expanded to the Pelican Lake area. This feature has provided for much higher visability and localized impacts at the project level.

A second feature to the Uinta Basin implementation strategy included the use of complete IWM aud salinity control plans as a basis for USDA cost-sharing through LTA's. The LTA approach provides for a more substantial commitment on behalf of the farmers and USDA, as well as providing assurance that long-term cost-share provisions will be locked-in for the life of the agreement. This allows for more comprehensive and effective onfarm planning and application. There are also annual cost-share provisions for those landowners who do not wish to participate in the LTA program. Pooling agreements with groups of landowners are also key features to project implementation through the ACP program.

Under the LTA phase of the program, 139 applications covering 11,954 acres were received in 1982. This makes a total of 313 applications on 32,892 acres since this project started. Plans have been developed and contracts formalized for 48 pooling agreements (4,108 acres), and three individual (258 acres) in 1982. Since 1980, this makes a total of 162 LTA contracts on 17,501 acres. This represents approximately 50 percent of the total applications received to date. Annual practice requests for 1982 totaled 25 which included 15 pooling agreements and 10 individuals. A total of 93 annual practice requests have been received since 1980. In 1982, SCS fully serviced 44 annual ACP referrals with 29 participants completing their practices. Fourteen applicants cancelled their requests for cost-share assistance.

Table IV-3 presents a summary of the practices applied in the Uinta Basin. The cumulative effects of these practices has served to raise irrigation efficiencies on about 1,470 acres from an average of 30 percent "before" to approximately 55 percent "after" practices were applied and maximum IWM has been achieved. This results in an estimated 5,354 acre feet per year reduction in deep percolation and an annual salt load reduction of 12,850 tons for the project. At Imperial Dam, this salt load reduction translates into a 1.34 mg/l reduction in Colorado River salinity concentration.

Table IV-3

Uinta Basin Irrigation Water Management
& Salinity Control Practices Applied

Practices	Units	1982	Cumulative
Pipeline (LTA) 1/	Ft.	184,108	506,825
(ANN) 2/	Ft.	19,031	132,008
Sideroll Sprinkler (LTA)	Ft.	51,425	94,421
(ANN)	Ft.	6,980	60,580
Pivot Sprinkler (LTA)	Ft.	4,695	8,557
Gated Pipe (LTA)	Ft.	29,947	56,957
(ANN)	Ft.	3,780	7,910
Reg. Reservoir (LTA)	Ea.	3	15
(ANN)	Ea.	—	3
Pump & Motor (LTA)	Ea.	14	36
(ANN)	Ea.	—	7
Land Leveling (LTA)	Ac.	158	243
(ANN)	Ac.	34	123
Irrigation Water Management (LTA)	Ac.	590	1,471
Wildlife Habitat Management (LTA)	Ac.	435	528
Nesting Platform (LTA)	Ea.	5	5
Wildlife Seeding (LTA)	Ac.	4	4
Shallow Water Areas	Ac.	10	10

1/ LTA is Long Term Agreement referrals

2/ ANN is annual ACP cost-share referrals

C. Extension Education

The ES is using general appropriation funds to conduct demonstration, information, and education programs. Extension specialists conduct water management workshops and other educational programs for farmers, technicians, county agents, and personnel of agricultural service and supply firms. Extension specialists also work with farmers in fine tuning irrigation practices to improve the irrigation efficiency and economy of operations. The ES, through the State Cooperative Extension Service (CES) in Utah and Colorado, has continued to provide this extension education support.

In the Grand Valley, the ES worked with the BR and the Colorado CES to develop a special extension education effort to assist both the BR canal and lateral lining activities and the USDA onfarm program. Through Memoranda of Understanding and working cooperative agreements, the Colorado CES has provided a full time extension specialist to assist in the Grand Valley project area. Major activities include working with landowners and irrigators to more formally organize working groups on the many irrigation distribution laterals. The extension specialist will also be assisting with USDA information and educational follow-up activities aimed at improving onfarm irrigation water management. Funds to support this education effort are being provided by the BR to Colorado CES through a reimbursable agreement with ES. Funding will continue through FY-83 for this extension education support at which time USDA and the Colorado CES will be expected to fund the position.

D. Research and Demonstration

USDA research and demonstration activities are vital to the continued development and improvement of new water management techniques and technologies which are beneficial to salinity control. The ARS, through the U.S. Salinity Lab at Riverside, California is involved in two research efforts related to the use of saline or brackish water (saline irrigation and drainage return flows) and the measurement of soil salinity with an electro-magnetic probe.

In the Imperial Valley, a large field experiment was initiated in January 1982 in cooperation with Imperial Valley Irrigation and Drainge District, California Division of Water, University of California, and private landowners, to develop management strategies for reusing drainage flow water, now wasted to the Salton Sea, as irrigation water. Use of such water would permit, in principle, a significant reduction in diversions to Imperial Valley without reduction in area irrigated, and thus would free Colorado River water for alternative uses.

A 40-acre area has been leveled into two 20-acre fields, each divided in roughly 1-acre plots. Two different cropping patterns are planned (wheat/sugar beets/lettuce and cotton/cotton/wheat/alfalfa) to assess not only the use of brackish water for tolerant crops, but also the potential of "rapid" shifts between growing salt tolerant and salt sensitive crops. Colorado River water and drain water are used sequentially as needed; they are not mixed.

On half the area, a crop was followed by beets, as planned; and a cotton crop was grown on the other half. Currently the cotton crop has matured and the beet crop is in the field. It is too early to present meaningful results, but experience to date is "on target".

The ARS, working in cooperation with the BR, also has a project underway to develop a nondestructive probe that can measure soil salinity status in a manner analogous to the soil water content measurement with a neutron probe.

The probe, an adaptation of a commercially available instrument that measures soil salinity of a profile from the surface, would provide more accurate and depth-specific data with high repeatability over time. The development has been set back by electronic difficulties encountered by a contractor, but recent results are promising.

In the Uinta Basin and Grand Valley projects, farmers with cablegation (automated) irrigation systems report that additional irrigations do not appreciably increase their irrigation costs. Consequently, they apply less total water than when they hand set their irrigations. Limited data collected to date by ARS and Colorado State University (CSU) indicate that this type of irrigation system increases yields and substantially decreases deep percolation. More data are needed to quantify the results of automation. Measuring and recording equipment will be needed to accomplish this objective.

The change of policy in Grand Valley which made automation a voluntary rather than compulsary condition for cost-sharing of irrigation improvements resulted initially in the installation of fewer automated systems. However, the excellent performance of some of the new automated systems developed by ARS and SCS, and satisfaction of their owners, are developing a situation where automation will be more widely accepted on its own merits.

In the Grand Valley, studies of level-basin irrigation on two major soil types are nearly complete. The results indicate that level basins are a practical and effective way of applying surface irrigation water. About 1/3 of the irrigated lands in the Grand Valley have deep enough soils and flat enough slopes to allow practical basin leveling. Level-basin irrigation eliminates surface runoff, allows close control of deep percolation, requires no more energy than traditional surface irrigation methods, simplifies irrigation water management, and reduces labor requirements or can easily be automated. Yields of corn alfalfa and small grains during five years of study have equaled and in some cases significantly exceeded Grand Valley average yields.

The second year's data have been obtained from a study of crop water use from high, saline water tables. Results to date indicate that water tables 60 cm and 105 cm below the soil surface can contribute significantly to water needs of corn and alfalfa, even though the water is highly saline. Established alfalfa obtained all water needed for evapo-transpiration during 1982 from a 60 cm water table. However, surface irrigation is still needed to prevent salt buildups at the soil surface. Methods of modifying irrigation scheduling procedures to account for high water table contributions will be developed after additional data are collected.

A final report has been issued in a cooperative study with CSU on design of irrigation pipelines to transport sediment laden irrigation water without excessive deposition, and on design of irrigation pipe turnouts from canals to minimize diversion of sediment into the pipelines. Another phase of the same study has evaluated techniques for minimum tillage of corn under graded furrow irrigation in the Grand Valley.

E. Monitoring and Evaluation

Monitoring and evaluation (M&E) activities have been extremely limited since initiation of the Uinta Basin and Grand Valley projects. The Utah Bureau of Water Pollution Control has recently completed a two-year monitoring program which essentially collected and established some baseline data. It included measurements on several stream sites, in return flow drainageways, and in some groundwater observation wells.

The SCS also provided funding for limited irrigation water management field monitoring by CSU in the Grand Valley in the 1980, 1981, and 1982 irrigation seasons. This field monitoring was to evaluate some of the furrow irrigation design criteria, and to monitor results of several onfarm irrigation improvements to determine implementation needs or modifications which would be useful to the program. CSU was also to evaluate effectiveness on reducing deep percolation and Colorado River salt loading from several irrigation systems. Copies of the February 1982 report are available through SCS or ARS.

Two significant 1982 monitoring activities included 1) the development of long-term monitoring plans from the Uinta Basin and Grand Valley projects and, 2) the installation of a "popcorn" data collection site in the Uinta Basin for irrigation management schedules and monitoring purposes. The long-term monitoring plans were developed to provide a basis for staffing and funding monitoring activities to evaluate program implementation impacts on water management, deep percolation, and salt load reductions. The monitoring plan is designed to evaluate a cross-section of various onfarm irrigation systems and will serve as a basis to more accurately determine project impacts. Major components of the plans include onfarm irrigation evaluations, wetland and wildlife habitat evaluations, data collection and analyses, plus an economic evaluation component to be added later.

The installation of an automated instrumentation site (Popcorn trade name) in the Pelican Lake area in 1982 is a new SCS endeavor to expand the SNOTEL (Snow Telementry) data collection system. Essentially, the "popcorn" site field installation will be used to automatically collect field data to be transmitted via telecommunication to the SNOTEL remote sensing network. The SNOTEL network, presently used for snow surveys and water (snow-melt) forecasting in the West, then transmits field data to computer access terminals where data can be recorded, stored, processed and analyzed.

The Popcorn site will collect data which influence evapo-transpiration rates used in irrigation water management scheduling. The unit will collect and transmit hourly readings on wind run, solar radiation, precipitation, daily maximum-minimum-mean temperature, humidity, soil moisture, and soil temperature. Instrumentation of flow measuring devices will also be a part of the automated data collection process. The information will be used as a part of the monitoring program and will also be used to assist with better irrigation scheduling.

The M&E plans have been developed with a broad cross-section of State and Federal interagency inputs. The activities are to be coordinated with other agencies to avoid duplication and to assure that the data collection and analysis will be complementary to the monitoring efforts of others.

V. INSTITUTIONAL AND INTERAGENCY COORDINATION

Under authority of Title II of the Colorado River Basin Salinity Control Act, an Advisory Council was created. The Advisory Council is composed of State representatives appointed by Governors of the seven Basin States. The Council is advisory only, and is established to act as liaision between USDI, USDA, EPA, and the Basin States.

USDI national program leadership has been delegated to the USBR. To provide for interagency coordination, BR established a Federal Interagency Salinity Control Committee composed of all Federal agencies either participating or interested in the salinity control program. Primary participants of this committee include USBR, Bureau of Land Management (BLM), EPA, Fish and Wildlife Services (FWS), U.S. Geological Survey, ARS, and SCS. Major Federal interagency coordination has been achieved through this committee. The committee provides an opportunity to coordinate planning and implementation schedules, to surface and resolve technical and programmatic issues, and to provide for open communication and free flow exchange of information between the agencies.

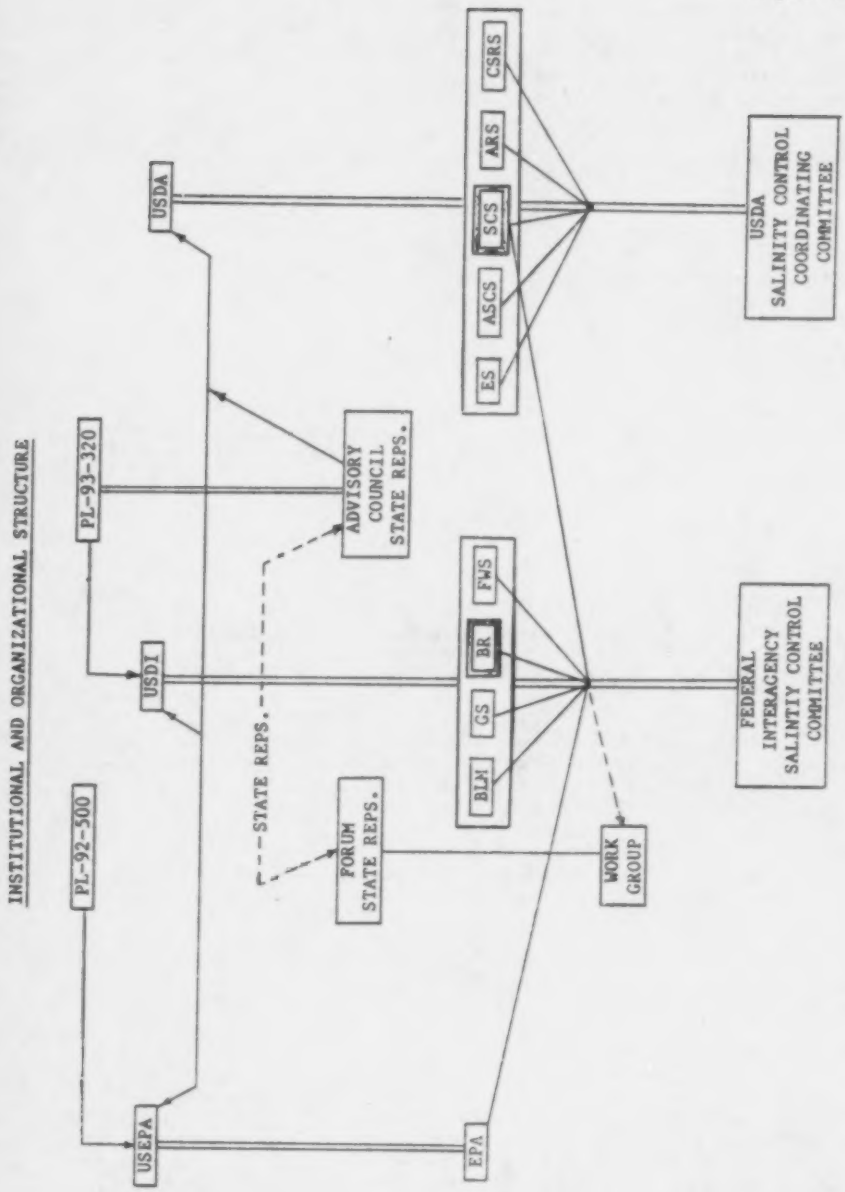
Within USDA, the Secretary of Agriculture has designated SCS as lead agency responsible for the USDA coordination necessary to implement efficiently the provision of the Act. Within the scope of that responsibility, SCS has designated Mr. Edgar Nelson, Director, Basin and Area Planning Division, as the USDA Salinity Control Liaison Officer. A separate USDA Salinity Control Coordinating Committee provides for internal USDA coordination between ARS, ASCS, ES, CSRS, and SCS.

Another major group, the Colorado River Basin Salinity Control Forum, is also a key participant in the institutional and organizational structure of the program. The Forum was established by the seven Basin States in response to the Clean Water Act of 1977 (Public Law 92-500). The Forum was created by the States to provide a procedure for developing and reviewing water quality standards for the Colorado River as required in Section 303 of the Clean Water Act. In many cases, the same people are on both the Forum and the Advisory Council because both deal with water quality standards and numeric salinity standards for the Colorado River.

Created within the Forum is a technical "Work Group" to provide technical support and backup for the full Forum membership. In addition to Forum members, a number of Federal advisory representatives also serve on this "Work Group" including USBR, BLM, FWS, EPA and SCS. The "Work Group" essentially prepares working documents for consideration by the full Forum membership.

Figure V-1 provides a general illustration of the institutional and organizational structure in the CRBSCP.

Figure V-1


INSTITUTIONAL AND ORGANIZATIONAL STRUCTURE
PL-92-500
PL-93-320
USEPA
USDI
USDA
EPA
ADVISORY COUNCIL STATE REPS.
FORUM STATE REPS.
STATE REPS.
WORK GROUP
BLM
GS
BR
FWS
ES
ASCS
SCS
ARS
CSRS
USDA SALINITY CONTROL COORDINATING COMMITTEE
FEDERAL INTERAGENCY SALINTIY CONTROL COMMITTEE

VI. FUNDING AND BUDGETING

For FY-83, USDA has continued to use multiple agency funding procedures. Various agency budgets for FY-83 were formulated independently and submitted through the normal budgeting process with no real effort to correlate or consolidate the CRBSCP funding levels. The general breakdown on agency funding levels for 1983 are as follows:

	FY-83	Change Over FY-82
SCS - Technical Assistance	$ 500,000	$ same
Salinity Units Studies	0	-200,000
ASCS - Cost Shares (ACP)	3,700,000	same
ARS - Research & Demonstration	1,000,000	+600,000
CSRS - Research Support	0	-161,000
ES - Extension Education	0	-250,000
TOTAL	5,200,000	-11,000

These funding levels essentially allow USDA to continue with the two implementation projects and to expand ARS research efforts. CSRS and ES activities are not funded for FY-83. There are no funds provided for SCS salinity control unit studies in FY-83.

ARS reports the $600,000 increased funding will be used to expand research on salinity control in the Colorado River Basin. A coordinated research approach and implementation plan involving several ARS locations is currently being developed.

During the past year, USDA did develop a proposal for a consolidated account to cover the USDA CRBSCP in FY-84. With the support and concurrence of the Under Secretary for International Affairs and Commodity Programs and the Assistant Secretary for Natural Resources and Environment, ASCS and SCS took the leadership to develop a fully coordinated budget package. Included within the consolidated account are funds for ASCS, SCS, and ES. The funds will provide for cost-sharing, technical assistance, salinity studies, monitoring, and extension education support. Research funding for ARS and CSRS were not included in the consolidated account at this time.

A component of the FY-84 consolidated budget proposal was a "modified" USDA CRBSCP implementation schedule. Previous implementation schedules showed rapid increases in funding levels from $5.0 million per year to in excess of $50.0 million per year in less than four years. Table VI-1 presents the "modified" USDA implementation costs and distribution which shows gradual funding increases with a peak ceiling of approximately $25.0 million per year in FY-88 through FY-93. The implementation time frame was extended by six years to be completed by the year 2000.

This modified implementation schedule presents a more gradual and realistic transition into full scale implementation of the various USDA onfarm salinity control projects. Figure VI-1 identifies the proposed projects and present implementation schedule for onfarm salinity controls. While this schedule may be changed, and is, of course, subject to Congressional funding, USDA feels that through this schedule the Colorado River salinity control objectives and water quality standards can still be achieved while States continue to more fully develop their compact-apportioned water supplies.

9-15-82

USDA
Colorado River Basin Salinity Control Program

Implementation Costs and Distribution
($ millions)

Agencies and Activities 1/	Prior Years	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	2000	Totals
1. ASCS Cost Shares	16.5	10.0	13.6	17.1	18.6	19.5	19.9	19.9	19.9	19.9	19.9	18.0	16.3	15.8	15.4	13.8	9.7	2.7	286.5
2. SCS Technical Assistance	2.6	1.5	2.7	3.4	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.2	3.5	3.5	3.5	3.0	3.0	1.0	59.9
Monitoring and Evaluation	0	0.7	0.8	0.8	1.0	1.0	0.8	0.8	0.8	0.7	0.8	0.6	0.8	0.8	0.8	0.6	0.6	0.6	13.0
Basin Studies	1.5	0.1	0.2	0.2	- - - - - - - - - - - - - - - - Undetermined - - - - - - - - - - - - - - - -														2.0
Subtotal SCS	4.1	2.3	3.7	4.4	5.0	5.0	4.8	4.8	4.8	4.7	4.8	4.8	4.3	4.3	4.3	3.6	3.6	1.6	74.9
3. Ext. Service Education Assistance	0	0.2	0.3	0.6	0.7	0.8	0.6	0.6	0.6	0.7	0.6	0.5	0.4	0.4	0.4	0.4	0.4	0.1	8.3
USDA Total Costs	20.6	12.5	17.6	22.1	24.3	25.3	25.3	25.3	25.3	25.3	25.3	23.3	21.0	20.5	20.1	17.8	13.7	4.4	369.7
No. of Projects	2	4	5	6	7	7	5	5	5	7	6	5	5	5	4	3	3	1	XX

1/ Research Activities of ARS and CSRS excluded.

Table VI-1

USDA
COLORADO RIVER BASIN SALINITY CONTROL PROGRAM
Cost, Implementation Schedule, and Salt Reduction Upon Completion

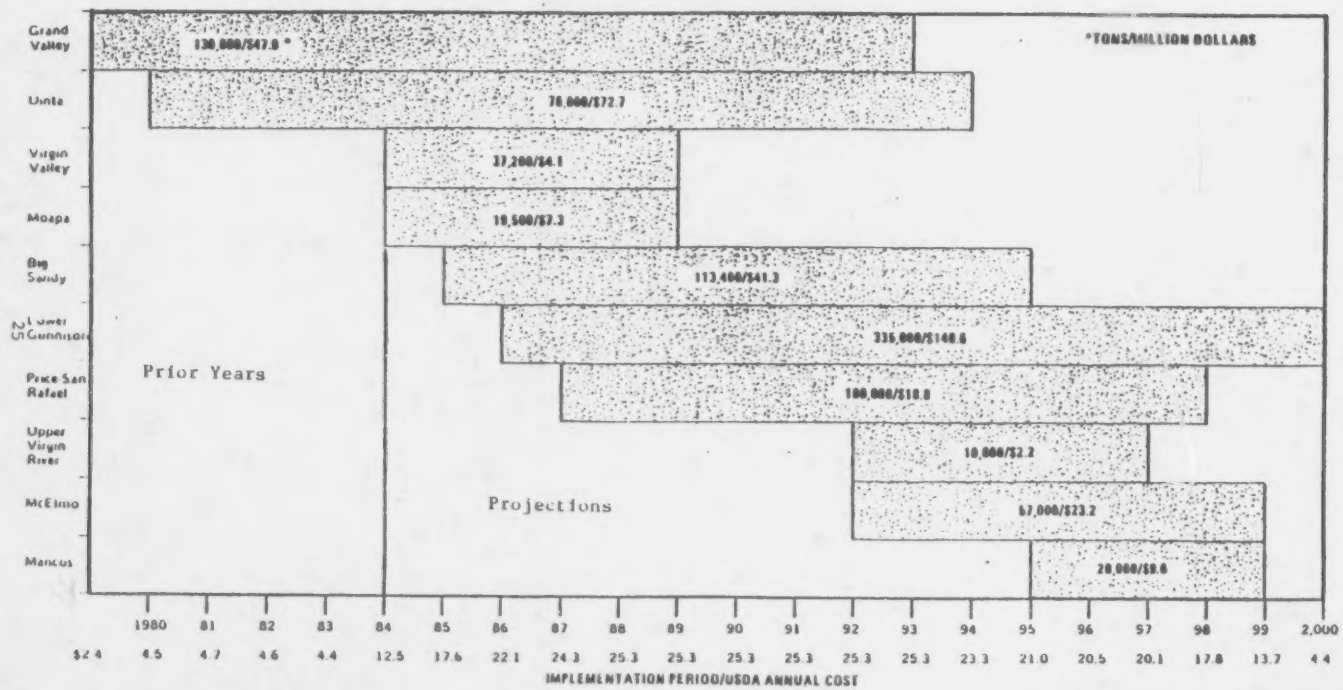


Figure VI-1

Total Salt Reduction = 898,000 Tons Per Year
Total Cost = $369.7 Million (Includes $2.0 Million for Basin Studies)
Total Economic Benefit = $529.8 Million Per Year

VII. LEGISLATIVE ACTIVITIES

There were numerous 1982 USDA legislative activities regarding the CRBSCP. With the support of the seven Basin States as expressed through the Advisory Council and Forum, Senator William Armstrong (D-CO) introduced legislation (S.2202) to amend the Colorado River Basin Salinity Control Act of 1974. Congressman Ray Kogovsek (R-CO) introduced a nearly identical bill (HR-6097) in the U.S. House of Representatives.

The essence of both bills included an expansion of BR planning and construction authorizations, the authorization of a separate USDA CRBSCP, and provisions for reimbursement of USDA Federal salinity control cost-share expenditures with power revenues from the upper and lower basin development funds.

Through SCS and ASCS, USDA worked with the USDI (USBR) and USEPA to help formulate an official Administration position. Chief Peter C. Myers of SCS testified on behalf of USDA at the Senate legislative hearing.

SCS and ASCS also worked with Department officials to develop a special USDA legislative proposal which would provide the Secretary of Agriculture with the necessary legislative authority to implement the funding program proposed in the FY-84 budget package.

VIII. PROJECTED 1983 ACTIVITIES

USDA will continue to be involved with many of the same activities in 1983 as in previous years; however, some new and expanded initiatives will be undertaken.

Continued activities will include a limited amount of salinity control planning in two irrigation salt source areas. Continued followup in the Price-San Rafael (UT) study and completion of the Mancos Valley (CO) study is scheduled. Implementation of the Wellton-Mohawk Title I project and the Grand Valley and Uinta Basin Title II projects will be continued at approximately the same level of intensity. Extension education support will also be continued.

Expanded initiatives include the broadened scope of salinity control research through the ARS. This activity is very important for the continued development and advancement of new irrigation water management and salinity control technology.

Implementation of a long term monitoring and evaluation plan will be undertaken in 1983. The monitoring plans, staff and funding needs, as well as equipment needs have been developed and partially funded. SCS proposes to initiate this monitoring effort during the 1983 irrigation season. The entire monitoring program is scheduled to be fully implemented by 1985.

Legislative activities will also be prompting some new USDA CRBSCP initiatives. In addition, specific program rules and regulations for implementing the program will be developed following legislation.

Senator NICKLES. Thank you Mr. Siegel. I might start with you on a couple of questions.

Mr. Siegel, you mentioned there were 10 areas that you would clean up about 80 percent of the salt problem in the United States?

Mr. SIEGEL. No, I said this would account for 80 percent of the salt problem in the Colorado River Basin attributable to agricultural irrigation.

Senator NICKLES. That was 80 percent strictly to the Colorado River basin.

Mr. SIEGEL. That's right.

Senator NICKLES. Have you looked at other problems in other areas of the United States?

Mr. SIEGEL. Other salinity problems in agricultural areas of the United States are being looked at in the respective States by our resident programs that we have, both the agricultural conservation program in ASCS and the Soil Conservation Service program of technical assistance. Salinity, I know, is a problem in many of the Western States and we feel for the time being our local and State-based conservation efforts are meeting those problems head on.

The Colorado River salinity program is a different program because of the water quality of a river that is so important to a great collection of States, which gives rise to a need for a multi-State solution under Federal auspices, and also because of the diplomatic and foreign relations aspects of the Colorado River salinity issue. So we feel the Colorado River salinity efforts of the Department of Agriculture have been in a class by themselves for some time and this needs to be formalized with the legislation we are seeking.

Senator NICKLES. Have you looked at some of the problems and possibly coordinated with the Corps of Engineers? For example on the Red River they are doing some salinity control measures right now, and I don't know how much if any they've coordinated with the Department of Agriculture and also in my State the Arkansas River has salinity control problems. Are you familiar with these?

Mr. SIEGEL. I have with me Joseph Haas who is Deputy Chief of the Soil Conservation Service for Natural Resource Projects and I'd like to call on him to respond to that.

Before I do, Congressman Whitten of Mississippi is very fond of saying in, his district anyway, when the Corps of Engineers puts down its shovel the Soil Conservation Service picks it up. The Corps of Engineers does the major big river projects and the Soil Conservation Service specializes in upstream watershed problems. And Mr. Haas is in charge of that entire program in the Soil Conservation Service. I'd like him to respond to the particular matters you mentioned.

Mr. HAAS. I can't give you the details of those particular problems you make reference to in Arkansas. We are aware of them. There also are saline seeps in Wyoming. All of them are being dealt with.

We frequently work in concert with the Corps of Engineers in generating studies of problems. We used to, under the auspices of the Water Resource Council, engage in comprehensive river basin studies and saline studies. The problems were certainly described in those kinds of reports.

We are aware of them, we do work with them on a day-to-day conservation basis in our other programs. But they are not concentrated as they are in the Colorado River Basin.

Senator NICKLES. It seems there's been an extensive study in the Colorado River Basin and we are aware there are some other serious salinity control problems. I would appreciate it if you would provide for the committee an update on that. Not just the two projects I'm interested in in Oklahoma, but nationwide. And here again I'm not trying to create work for you, but if you could provide us some of that information, give us a little bit better scope of where we stand nationwide, it would be appreciated.

Mr. HAAS. We'll provide that for the record.

[The requested information follows:]

The U.S. Army Corps of Engineers (COE/Corps) has the major lead through the Arkansas-Red River Basin Chloride Control Project for the Salinity problems of the Arkansas and Red Rivers in Oklahoma,. The Department of Agriculture (USDA) is not actively involved with the Corps project; however, interagency coordination and communication is maintained through the Arkansas-White-Red River Interagency Committee established by the Corps. The Corps chloride control activities on the Arkansas River have been suspended because it is not cost beneficial. Work on the Red River is cost beneficial and the Corps is continuing with that program. The chloride control project is basically an off-farm salinity control effort aimed at controlling saline springs and seeps through off-farm, non-agricultural structural measures such as injection wells, brine reservoirs, and evaporation ponds.

We feel that the present USDA programs in each State are addressing other nationwide salinity problem issues. Unfortunately, at this time we do not have national data or inventories on the scope and magnitude of the national salinity problems. However, USDA has recently decided to include salinity and saline seeps as part of the 1985 National Conservation Program appraisal. This activity is being undertaken consistent with the objectives of the Resource Conservation Act (RCA) of 1977. In fact, a national salinity assessment has been proposed to provide a preliminary evaluation of the nationwide salinity problems.

The Soil Conservation Service has spent about $983,000 in seven States through the targeting and RCA pilot demonstration programs for ongoing and resident State level programs in 1983. These funds are complemented by about $1,700,000 in cost-sharing funds made available through the Agricultural Conservation Program of the Agricultural Stabilization and Conservation Service. A few of the salinity problems being addressed are:

(1) Saline seeps in Montana;

(2) Irrigation, soil salinization, and saline drainwater disposal in California;

(3) Groundwater management and control over pumping to prevent saltwater intrusion in Florida;

(4) water conservation and surface water management to prevent saltwater intrusion in North Carolina;

(5) water conservation and salinity control on the upper Arkansas River in Colorado.

In addition, salinity control research funds in excess of $1 million have been obligated through USDA research programs. In total, these represent over $2.7 million for other national salinity control problems.

We are very pleased with our national salinity control efforts at present, but do feel that the situation in the Colorado River and the national salinity assessment are both important and deserving of additional attention.

Mr. SIEGEL. As a matter of fact the national conservation program of the Department of Agriculture which was sent by President Reagan to the Congress last December, adopted the philosophy that critical areas for conservation problems would be singled out and given special attention and we have some soil salinity areas in the West which are going to receive and have already received this kind of attention. So we'll be happy to give you the report that you request.

Senator NICKLES. You mentioned having more flexibility. The bill before us does provide specific authorization for each year. You did not want to have those amounts, or you wanted to have no amounts listed? What were you looking for?

Mr. SIEGEL. Such sums as necessary.

Senator NICKLES. Is that like a blank check?

Mr. SIEGEL. Well, it's simply a request for more confidence in what the administration is planning to do. We are not flying completely blind. We have plotted out a program in the administration for addressing this problem. We have flow charts, which are contained in this blue pamphlet which we have placed in the pending budget. In the fiscal year 1984 budget, we have requested $12.5 million just for agricultural salinity control work in the 1984 fiscal year. This particular item has not been approved by the appropriations commmittees in either body because the necessary authorizing legislation was not yet ready. S. 752 has such legislation in it and so does S. 1842, the bill that was introduced today that contains only the agricultural portion.

So we have exhibited our good faith in the fiscal year 1984 budget request in a year of very constrained budgets. In the discretionary programs in our department, of which this is one, we have been able to nudge an increase in salinity control work.

Senator NICKLES. What would be your actual out of pocket say for this fiscal year? You mentioned you requested what?

Mr. SIEGEL. $12.5 million.

Senator NICKLES. What would it be for this year?

Mr. HAAS. I might be able to answer that partially. Of course as you pointed out earlier, this collection of various budgets of various agencies working on it, but it totals approximately $5 million for 1983, from both Soil Conservation Service, ASCS, et cetera.

Senator NICKLES. The levels mentioned in this bill were considerably higher if my memory serves me correct, an emphasis on the Colorado River alone.

Mr. SIEGEL. That's right, the authorization levels are higher, which is why we would prefer that in our good faith in proposing amounts in our budget, our amounts not be compared to a very high set of authorization figures, but we should instead be allowed to proceed at the pace we consider appropriate each year. And I think our good faith is exhibited by the fact we've been willing to propose this increase already.

Mr. HAAS. We have at present only two studies or two projects on line. When you add on, these will continue for a few years. As you add on the new studies there will be some increases in cost obviously. $4 million per year is not adequate to do the complete job.

Senator NICKLES. Mr. Broadbent, you mentioned you did not seek or hope to authorize six additional projects until the feasibility studies were completed on those projects. Could you give us an estimate when those studies might be complete?

Commissioner BROADBENT. We presently have one study that is out for comment right now, the one on the Gunnison River. The other studies are probably spread out over 2 or 3 years.

Senator NICKLES. You're also calling for what, a 25-percent cost sharing? Is that upfront money?

Commissioner BROADBENT. It's 25 percent with interest and the interest is based on the rate that the Government has to pay for its money so it can either be up front or 25 percent over time at comparable Government interest rates.

Senator NICKLES. But that 25 percent coming from the users?

Commissioner BROADBENT. Yes, from the States.

Senator NICKLES. Gentlemen, I appreciate very much your input. We're in a little bit of a time bind.

Commissioner BROADBENT. If I could explain a litt'e bit about where that money would come from. A good part of it would come from users of the power gererated by Federal facilities in the Colorado River Basin. That is already provided in a proposed bill, S. 268 which has passed the Senate. That bill would authorize adding 2.5 mills for salinity control along the Colorado River, which is about $8 or $10 million a year.

Senator NICKLES. That's as far as the cost-sharing portion?

Commissioner BROADBENT. Yes.

Senator NICKLES. Thank you very much for your comments, and thank you in particular, Commissioner, for your willingness to sit through with us this morning. It's appreciated.

Will the next panel come up please?

Gentlemen we appreciate your willingness to travel afar. I think all of you did travel from the western part of the country for this morning's hearing and it's appreciated.

Is someone in your group to be the spokesman? Mr. Steiner?

STATEMENT OF WESLEY STEINER, DIRECTOR, DEPARTMENT OF WATER RESOURCES, PHOENIX, ARIZ., ACCOMPANIED BY MYRON B. HOLBURT, CHIEF ENGINEER, COLORADO RIVER BOARD OF CALIFORNIA, LOS ANGELES, CALIF.; J. WILLIAM McDONALD, DIRECTOR, COLORADO WATER CONSERVATION BOARD, DEPARTMENT OF NATURAL RESOURCES, DENVER, COLO.; CARL L. SLINGERLAND, STAFF ENGINEER, NEW MEXICO INTERSTATE STREAM COMMISSION, SANTA FE, N. MEX.; DANIEL F. LAWRENCE, DIRECTOR, DIVISION OF WATER RESOURCES, SALT LAKE CITY, UTAH; PAUL SCHWEIGER, DEPUTY STATE ENGINEER, CHEYENNE, WYO.; AND JACK BARNETT, EXECUTIVE DIRECTOR, COLORADO RIVER SALINITY CONTROL FORUM, BOUNTIFUL, UTAH

Mr. STEINER. I'm Wesley Steiner. I'm the director of the Arizona Department of Water Resources, and I'm accompanied to the table by representatives of each of the other Colorado River Basin States and the executive director of the Colorado River salinity control forum.

Governor Babbitt planned to fly in early this morning to testify on behalf of the States and the forum. He wrenched his back yesterday and was unable to make the trip. He asked that I convey his regrets and his apologies to you, Mr. Chairman.

I will ask that the Governor's testimony and the testimony of each of the States be made a part of the record and I will attempt to stand in for the record and highlight his testimony for you.

Senator NICKLES. For each of our guests today, their statements will be entered into the record in full.

[The prepared statements of the panel members follow:]

Colorado River Basin

Salinity Control Forum

GOVERNORS
Bruce Babbitt, AZ
George Deukmejian, CA
Richard D. Lamm, CO
Richard Bryan, NV
Toney Anaya, NM
Scott M. Matheson, UT
Ed Herschler, WY

FORUM MEMBERS
Arizona
Wesley Steiner
Ronald L. Miller
Stewart Udall
California
Myron B. Holburt
Walter G. Pettit
Colorado
David W. Robbins
D. Monte Pascoe
Robert A. Arnott
Nevada
Jack L. Stonehocker
Lewis H. Dodgion
Roland D. Westergard
New Mexico
Stephen E. Reynolds
Utah
Daniel F. Lawrence
Calvin K. Sudweeks
Wyoming
George L. Christopulos
William L. Garland

EXECUTIVE DIRECTOR
Jack A. Barnett

Testimony
to
SUBCOMMITTEE ON WATER AND POWER
of the
SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES

September 15, 1983
by
Governor Bruce Babbitt
for the
State of Arizona
and the
Colorado River Basin Salinity Control Forum
in Support of
S. 752

More than 15 million residents of the States of Arizona, California, Colorado, Nevada, New Mexico, Utah and Wyoming are served to one degree or another by the Colorado River. They live in the most arid region of the United States and rely heavily upon the Colorado River for municipal, industrial and irrigation water as well as for hydro power and recreation. Our neighbors south of the border in the Republic of Mexico also depend on the waters of the Colorado to meet much of their needs.

Throughout most of this century the states and water interests of the Colorado River Basin have been working with the Congress, the federal administration, the judiciary and state legislatures to establish what has become known as "the Law of the River." Through compacts, agreements, legislation, litigation, and a treaty with the Republic of Mexico, a political miracle has been accomplished, an understanding as to the apportionment of the waters of the Colorado River.

During the last two decades, issues involving the quality of this important resource have come to the fore and have been brought to the negotiating tables. The seven Colorado River Basin states were quick to realize that the salinity of the River and its control are basin-wide problems with national and international overtones that demand their close cooperation and collaboration and the assistance of the federal government. In the 60's the rising salinity of the River provoked protests from the Republic of Mexico and resulted in further agreements with that nation. In 1974 the Colorado River Salinity Control Act (P.L. 93-320) was carefully formulated by the states and Congress so that water quality matters could be appropriately addressed in the context of the existing "Law of the River."

Title I of that Act addresses the salinity control programs needed to implement the agreements between the United States and Mexico. Title II of the Act deals with salinity concerns in the United States above Imperial Dam. The Congress authorized and directed the Secretary of the Interior to take the lead in implementing the federal portion of the salinity control effort. The Act further directs that the Secretary of Agriculture work cooperatively with the Secretary of Interior in searching for ways to control the salinity of the Colorado River. Four salinity control units were authorized by the Congress in Title II of the 1974 Act and additional units were identified for further investigation by the Department of the Interior.

In recognition of the fact that the quality of the Colorado River is a basin-wide problem that demands the coordinated attention of all Basin States, the Governors of the seven states created the Colorado River Basin Salinity Control Forum and charged it with the task of finding the most effective means of controlling the salinity of the River. The alliances and agreements that have been forged through the action of the Salinity Control Forum are truly unique and remarkable considering the needs and responsibilities of the seven states and the two nations. Appearing with me today are representatives of the Governors of all seven of the Basin States and the Forum's Executive Director. Collectively they bring together a wealth of knowledge and experience in water resource matters and the capabilities and limitations of the Colorado River. I estimate that they have a combined experience in the water resources field of in excess of 200 years. They are here to demonstrate seven state solidarity and support and to answer any questions you may have.

As salts become concentrated beyond a relatively low level they detract rapidly from the usefulness of a river's water supply. The Bureau of Reclamation advises that the current level of salts in the

flows of the Colorado River result in annual damages to U.S. water users of $120 million and that if salinity control measures are not implemented by the year 2020 to control the increase in salinity that will result from man's increased use of the River, the level of damages will almost double to $238 million per year.

The salinity objectives agreed to by the seven states and the Environmental Protection Agency on the Colorado River call for the maintenance of salinity levels below Hoover Dam, below Parker Dam, and at Imperial Dam at 1972 concentrations while the states continue to develop their compact apportioned water supplies. The allowable salt concentrations range from 723 mg/L at Hoover Dam to 879 mg/L at Imperial Dam, measured as average annual flow-weighted total dissolved solids concentrations. If salinity control measures are not implemented, it is estimated that the concentration at Imperial Dam would exceed 1,100 mg/L shortly after the turn of the century. The levels of salinity concentration that would occur without effective salinity control are clearly not acceptable.

Approximately 9 million tons of salt reach Lake Mead each year, some from natural causes and some from the actions of man. It has been determined that by the turn of the century more than 2 million tons of salt must be removed or prevented from entering the River annually if the downstream numeric criteria are to be met. This is a tall order, one that the seven Colorado River Basin states, working as the Colorado River Basin Salinity Control Forum, after almost a decade of efforts to control salinity under the authorizations of the 1974 Act (P.L. 93-320) have determined necessitates that this important Act be modified and updated.

Over the last two years the Basin States have developed amendatory legislation and are now in unanimous agreement as to the modifications that need to be made. The seven Colorado River Basin States support S. 752 as introduced with only very minor technical changes.

In the control of salinity, time runs against us. The states believe that it is critical that the legislation we support here today be quickly implemented. In our judgment, failure to act will result in the loss of valuable time and will prevent the Department of the Interior and the Department of Agriculture from implementing the salinity program in the most cost effective way.

S. 752 would authorize the Secretary of the Interior to spend the funds that were authorized in the Act of 1974 on a total of ten salinity control units, including the four originally authorized by

the Act. The selection of the larger number of salinity control units is based on extensive studies by the Department of the Interior and will allow the Secretary flexibility in determining where the funds can be spent most cost effectively. It is not intended that every component of every one of the units be constructed as some will be found to be less cost effective than others. Let me emphasize, the Bill does not increase the total amount of funds authorized to be expended by the Secretary of the Interior by the original Act in 1974.

The proposed legislation would establish a new program in the Department of Agriculture which would allow that Department, on a voluntary cost share basis, to offer assistance to farmers in the improvement of irrigation practices. The benefits to salinity control from improvements in return flows from irrigated lands are highly significant even though, to a large degree, the benefits occur hundreds of miles downstream. We have learned over the last decade that some of the most cost effective salinity control strategies involve technologies that the Department of Agriculture can best advance as on-farm improvement in agricultural practices. S. 752 would authorize the Department of Agriculture to create this new program, write rules and regulations that will be especially tailored to the needs of the salinity control program on the Colorado River, and to spend, through the 1989 fiscal year, up to $186,600,000 on cooperative cost sharing ventures. We anticipate that the farmers will spend up to $50 million and countless hours as their share in implementing the program.

I observe with great interest the expanded regional approach that is at the heart of the proposed new agricultural program. Upstream irrigators will modify farming practices that have been in place for more than half a century. Yes, an irrigator in the Grand Valley in Colorado will invest his money, time, and effort to do a better job of farming so that water users in southern California, central Arizona, on the Indian reservations along the River and in Mexico can be spared the adverse impacts that would otherwise accompany the deterioration of the quality of their water supplies. The proposed legislation provides for a sharing of cost. The end result is that the entire basin will benefit as some of the most cost effective programs are implemented on private land, on a voluntary basis.

The salinity control program as authorized in 1974 included state cost sharing provisions. The legislation before you today continues these provisions with the two basin power accounts paying back 25 percent of the federal costs. The states shares are raised through incremental charges for energy developed on the Colorado River. In this way the states will pay more than $100 million for salinity

control. S. 752 would continue 25 percent cost sharing in the Department of the Interior's program and would authorize identical cost sharing for the Department of Agriculture's program.

With the states investing $100 million. it follows that they will be concerned about cost effectiveness of the program. We fully support the concepts in the proposed legislation which require that before salinity control units are constructed they be evaluated to determine that they are, in fact, among the most cost effective alternatives that current technology will permit. The legislation gives the Congress and the states an opportunity to review the findings of the Administration before salinity control units are implemented.

On behalf of the State of Arizona and the seven Colorado River Basin States, I want to thank this Committee for the attention it is giving to this important legislation. In the short term, we offer the cooperation and support of the states and the Forum and its staff to assist the Congress as it considers this legislation. In the long term, we offer a state/federal partnership in the implementation of this most important water quality control effort. The panel of state representatives and I stand ready to answer any questions that the Subcommittee might have.

Thank you.

State Panel Members

The Honorable Bruce Babbitt
Governor of Arizona

Wesley Steiner, Director
Arizona Department of Water Resources

Myron B. Holburt, Chief Engineer
Colorado River Board of California

J. William McDonald, Director
Colorado Water Conservation Board

Jack L. Stonehocker, Director
Colorado River Commission of Nevada

Stephen E. Reynolds, State Engineer
New Mexico

Daniel F. Lawrence, Director
Utah Division of Water Resources

Paul Schwieger, Deputy State Engineer
Wyoming

Statement of Myron B. Holburt, Chief Engineer
Colorado River Board of California
in Support of Senate Bill S. 752

I am pleased to have the opportunity to submit to the Committee a statement in support of S. 752. I also want to express support for the statement submitted to the Commitee by Governor Bruce Babbitt of Arizona, on behalf of the seven-state Forum. My statement will primarily focus on the impact of Colorado River salinity on California.

The Colorado River Board of California strongly supports the federal government's Colorado River Salinity Control Program, and helped establish the Forum to work for implementation of a basin-wide salinity control program. I have been one of California's representatives on the Forum since it was established in 1973.

Two of the salinity control units authorized by P.L. 93-320 in 1974 (Colorado River Basin Salinity Control Act) are under construction. Other units identified in P.L. 93-320 have been shown to be cost-effective and S. 752 accomplishes the purposes of P.L. 93-320 by authorizing them for construction. Additional funding is not requested beyond that authorized in 1974 for projects to be constructed by the Department of the Interior. The proposed legislation allows the Secretary of the Interior to use presently authorized

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Presented before the Subcommittee on Water and Power of the Senate Committee of Energy and Natural Resources, September 15, 1983.

funds to construct the most cost-effective components of the units.

Over the past several years, it has become clear that the onfarm water management programs of the Department of Agriculture are among the most cost-effective means of salinity control. Senate Bill S. 752 establishes a new Department of Agriculture program of voluntary cost-share onfarm water management for salinity control.

The salinity of the Colorado River is a matter of great concern to California. Southern California receives about 65 percent of its total water supplies from the Colorado River, which provides a full water supply to about 800,000 irrigated acres and a full or supplemental supply to about 12 million people. Because of California's' location at the lower end of the Colorado River Basin, the water that it diverts contains all of the dissolved salts that have entered the water upstream.

At Parker Dam, where diversions are made for service to a large urban area on the coastal plain of Southern California and to the Central Arizona Project, the salt concentration, which varies in proportion to river flows, has been averaging about 725 milligrams per liter (mg/l) over the past few years. This is forty percent greater than the 500 mg/l that has been recommended as the maximum secondary contaminant level for salinity for domestic purposes by the U.S. Public Health Service. At Imperial Dam, where most of

California's and Arizona's agricultural water is diverted, salinity has been averaging about 825 mg/l. This water supply is classified as a high salinity water for irrigated agricultural use by the United States Salinity Laboratory of the Department of Agriculture.

The detrimental impacts of salinity on users of Colorado River water were determined by the Bureau of Reclamation and reported in "Colorado River Salinity-Economic Impacts on Agricultural, Municipal, and Industrial Users", dated December 1980. This report summarizes the results of earlier studies funded partially by the Bureau of Reclamation, which studies are the most comprehensive yet undertaken of economic impacts of salinity. Even so, the study does not cover all detriments experienced by water users, omitting for example, some of the detrimental impacts on industrial users. Because of these omissions and the additional detriments experienced in local areas described later in this statement, I believe that the cost to users is even greater than is set forth in the Bureau's report.

In this statement, I will briefly describe the areas of Southern California that are using Colorado River water, the ways that the urban and agricultural users of Colorado River water have been adversely affected by high salinity Colorado River water, and what they have done to alleviate some of these effects. The impacts experienced by California's urban and agricultural users are also being felt by our neighboring

states of Arizona and Nevada.

Areas Using Colorado River Water

The Southern California metropolitan area presently receiving Colorado River water is one of the major population centers of the nation. This region had a 1980 population of about 12 million, and the Metropolitan Water District of Southern California serves this area with both Colorado River water and water from northern California. In 1980, Metropolitan imported 820,000 acre-feet from the Colorado River and 560,000 acre-feet from the California State Water Project to serve its area. The area overlies groundwater basins containing vast alluvial aquifers which are relied upon as a water source for about a third of the area's total water requirements.

In the desert region of California, Colorado River water constitutes the only source of supply for about 100,000 persons residing in Imperial Valley and along the Colorado River from Needles on the north to the Mexican Border.

Colorado River water is used in irrigating about 800,000 acres in California on which many specialized high-value crops are grown such as avocados, dates, citrus, grapes, and winter vegetables, as well as basic crops such as cotton, alfalfa, wheat, and sugar beets. Most of these lands are located in the inland desert region of Southern California in Imperial, Coachella, Palo Verde, and Yuma Valleys and the balance, about 40,000 acres, are located on the coastal plain

served by the Metropolitan Water District. Imperial and Coachella Valleys lie southerly and northerly, respectively, of the Salton Sea, and the Palo Verde and Yuma Valleys lie along the Colorado River.

Salinity Impacts on Urban Areas

The harmful economic impacts on urban water users caused by using Colorado River water, which is both a high salinity water and has a high hardness, are:

1. Reductions in the useful lives of: (a) water utility distribution facilities; (b) home, business, and industry piping and fixtures; (c) water using devices within homes, business and industries, and (d) home and industry heating vessels.

2. Increase in water treatment and conditioning costs.

3. Increase in the use of bottled water because of objectionable taste characteristics.

4. Damages to ornamental shrubs and plants requiring early replacement.

Some of these impacts are experienced as current expenses, but most are experienced as decreased service lives of the affected facilities and are thereby probably overlooked by many domestic and commercial water users.

The above described detriments result in additional water costs incurred by the urban user of Colorado River water, and the major portion of the detriments are quantified in the December 1980 Bureau of Reclamation report. The

costs to California urban users summarized in that report are many tens of millions of dollars a year. However, the report does not include some detriments such as the loss of the potential for reuse of water.

These latter, unquantified detriments also cause substantial economic detriments from the reduced reuse possibilities of high salinity water and problems associated with its use in areas that rely on ground water basins as well as on surface water deliveries for their water supplies. Most of the water delivered to urban communities is not consumptively used but ends up as either sewage effluent or underground percolating waters. These waters, if not too saline, would normally be available for reuse. However, if the water supply has a high salinity, reuse options are precluded, with the only treatment alternative that would permit any reuse being desalting, which is far too costly.

It is difficult to develop a dollar value for these impacts but it is evident that they do represent economic detriments to the use of hign salinity water.

Measures to Reduce Impact of Colorado River Salinity in Urban Areas

Both individual water users and water distributing entities have adopted measures that reduce to some extent the harmful impacts of high salinity water. Metropolitan has been blending its more costly water supplies from northern California, with a salinity of about 250 mg/l of dissolved

solids, with its Colorado River water to reduce the water salinity to a blended quality of about 500 mg/l. Several hundred thousand water users, both domestic and commercial, have installed individual water softeners on their plumbing facilities. The use of bottled water is widespread. Individuals have attempted to reduce the impact of corrosion of plumbing facilities by installing premium materials for vulnerable facilities, for example, copper, rather than galvanized iron pipes, and high grade copper alloys to lessen the effects of the zincification of less costly copper alloy fixtures.

State water quality control agencies have established salinity standards for waste discharges in subbasins of the Santa Ana River Valley, a major inland valley in coastal Southern California, which severely limits the use of Colorado River water in those basins. Waste discharges in the upstream basins both percolate into the ground water aquifers and are available for reuse and flow as a surface stream to downstream basins for reuse. The salinity standards have been set to conform to plans for the basins that have been made pursuant to Section 208 of the Federal Clean Water Act.

Salinity Impacts on Agricultural Areas

Colorado River water, classified as high salinity water, requires special management in its use so that the crop yields may be maintained and low salt tolerant plants will

not be damaged or killed. The key aspect is controlling the total salt concentration of the soil-water solution in contact with the germinating seeds, and, later, the plant's roots. The predominant factor restricting plant growth is the total salt concentration of the soil-water solution. When the applied water is of a high salinity and the soils are such that it is difficult to maintain the soil-water solution at a low salt concentration, high value crops with a low salt tolerance cannot be grown.

Sufficient water must be applied to meet the consumptive use requirement for each crop as well as enough extra water for conveying, or leaching, salts down through the root zone to control salinity. This extra water is called the leaching requirement. In most of the California areas receiving Colorado River water, correct management practices require underground drainage pipes to remove the highly saline soil-water solutions where the soils lack adequate natural drainage to carry away the leaching water.

Additional management practices that must be implemented, depending upon soil, crop and salinity of the applied water, include precision land levelling, special irrigation practices, and choosing crops with high salt tolerances.

The components of the economic detriments to irrigators in using Colorado River water of high salinity are numerous and difficult to determine with accuracy. The studies

summarized in the Bureau of Reclamation's 1980 report were designed to develop a measure of the costs experienced by all irrigators in the study areas using Colorado River water. The studies are based on the assumption that each irrigator would undertake those measures that would optimize his return, either by going to lower valued crops, or by taking other measures that would assist him in maintaining productivity as long as practicable. California farmers are combatting the Colorado River's salinity by incurring direct expenses such as installing underground drainage pipes, lining canals and laterals, levelling lands and installing sprinkler systems, all with the goal of being able to continue to use their high salinity water supplies. These measures also increase operating costs, since: (1) more farm labor is required to operate more precise irrigation methods, (2) additional water must be purchased for leaching salts, (3) added fertilizer must be purchased and applied because of the increase in applied water, and (4) underground drainage pipes must be maintained.

The costs to California agricultural users summarized in the Bureau's 1980 report is, as for the urban users, many tens of millions of dollars a year.

Measures to Reduce Onfarm Impact of Colorado River Salinity

Farmers using Colorado River water apply various management practices to continue the beneficial use of the

high salinity water. Some practices are applied by individual farmers while others are implemented by the irrigation districts providing water service to an area. Irrigation districts have installed master networks of deep ditches, or drains, and have supported the efforts of the farmers to install pipe drains under their lands that discharge into the master drains.

Other management measures have been adopted by farmers as required by their individual circumstances in coping with the high salinity of the Colorado River water. Measures that have been implemented include the precise laser levelling of farms to enable flood, rather than furrow, irrigation to be practiced. Flood irrigation on the precisely levelled lands provides uniform water penetration and efficiently transports dissolved salts in the soil-water solution below the root zone to the drainage system with a minimum of applied water. Where land levelling is impractical sprinklers have been installed to develop the same effect. In both cases, irrigation must be scheduled with smaller quantities of water at each irrigation and at more frequent intervals to maintain a downward movement of salts.

These management practices require the expenditure of substantial sums of money, with expenditures of about $500 per acre for a sprinkler irrigation setup and about $50 to $100 per acre or more for precision land levelling. As many farmers may not have access to the capital necessary for such

28-181 O - 84 - 11

practices, they may be forced to change to more salt tolerant crops that yield a lower income.

The tnree major public agencies serving Colorado River water in the desert portion of California are Imperial Irrigation District, Coachella Valley Water District, and Palo Verde Irrigation District. All of these agencies have supported and are continuing measures to enable their farmers to make beneficial use of Colorado River water. The measures undertaken by Imperial Irrigation District and its farmers are illustrative of the measures required to handle high salinity water on fine textured soils.

Imperial Valley soils are predominantly fine textured, with high percentages of clays and silts. These soils do not drain well, and the valley farmers found out early that, even with the construction of deep channels as open drains, there was insufficient lateral movement of water through the soils to these open drainage ditches for their lands to be kept free from salt buildup. In 1929, some farmers began the installation of underground pipe drainage systems below their fields to obtain positive drainage flows.

Encouraged by the success of these early installations, the District has aggressively encouraged farmers to install and maintain pipe drainage networks under their lands. Through 1980, a total of over 27,000 miles of undergound drainage pipes have been installed by local farmers, which drain into the surface drainage ditches maintained by the

District. These underground drainage pipes have cost over $70 million. Underground drainage lines must be cleaned of accumulated deposits and incrustations at two to five-year intervals, at a cost of about $600 per mile of pipe.

The Imperial Irrigation District has also been lining its laterals with concrete to decrease the seepage of irrigation water into the soil and thereby reduce the drainage problem. Private landowners have been lining their farm ditches with the same objective. Through 1980, 759 miles of District laterals have been concrete lined at a cost in excess of $20 million, and 2,276 miles of private farm ditches have been lined at a cost of nearly $29 million.

In addition to these costs, farmers in Imperial Valley have spent large sums on other measures to enable the continued growing of high-value crops with Colorado River water. These measures have included all of those mentioned earlier, and, in addition, a measure to assure the germination of seeds by moving portable sprinkler systems onto fields and using them for the initial germination and commencement of growth of the plant. After the plants are established, the sprinkler systems are removed and the balance of the irrigation requirements are met by furrow or flood irrigation processes.

Summary and Conclusions

The detrimental salinity impacts on California users of Colorado River water are both demonstrable and of substantia.

magnitude. The current cost to California's Colorado River water users is many tens of millions of dollars a year and will increase significantly unless the additional salinity control units identified in P.L. 93-320 and the extensive onfarm salinity control measures to be authorized by S. 752 are implemented. The Colorado River Board of California strongly urges the passage of S. 752.

STATEMENT OF J. WILLIAM McDONALD, DIRECTOR
COLORADO WATER CONSERVATION BOARD

BEFORE THE

SUBCOMMITTEE ON WATER AND POWER
COMMITTEE ON ENERGY AND NATURAL RESOURCES
UNITED STATES SENATE

CONCERNING S. 752

Washington, D.C.
September 15, 1983

Introduction

My name is J. William McDonald. I am testifying today on behalf of Colorado's representatives to the Colorado River Basin Salinity Control Forum: Mr. Monte Pascoe, former Executive Director of the Colorado Department of Natural Resources and now in private law practice; Dr. Robert Arnott, Assistant Director of the Colorado Department of Health; and Mr. David Robbins, former Colorado Deputy Attorney General now in private law practice. In my capacity as Director of the Colorado Water Conservation Board, I am Mr. Pascoe's alternate to the Forum and one of Colorado's representatives to the Forum's work group.

Summary of Statement

Colorado favors enactment of S. 752, a bill concerning amendments to the Colorado River Basin Salinity Control Act of 1974 (P.L. 93-320). The program authorized by Title II of the Act is an integral component of the effort to control the salinity of the Colorado River. It is important that this program now be updated and expanded to reflect the information and understanding gained since the passage of the Act.

We recommend only one minor change to the bill as introduced. Paragraph (12) of Section 1 of the bill would strike a sentence from the original Act. This seems to be a drafting error which needs to be corrected by deleting paragraph (12) from the bill.

183
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Testimony

Following the passage of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500), the seven states of the Colorado River Basin organized the Colorado River Basin Salinity Control Forum (hereinafter referred to as the Forum) for the purpose of fostering a coordinated, basin-wide approach to the salinity problem in the Colorado River system. The objective of this coordinated, basin-wide approach is the maintenance of salinity in the lower mainstem of the Colorado River at the concentrations occurring in 1972 (expressed as numeric criteria) while the states continue to develop their compact apportioned waters. In order to maintain the numeric salinity criteria in the lower mainstem which have been adopted by the states and approved by the Environmental Protection Agency, it has been estimated that about 2.8 million tons of the approximately 10 million tons of salt which now enter the river on an average annual basis will need to be removed by the turn of the century.

In recognition of the federal role in and responsibility for a water quality problem which has both interstate and international dimensions, Congress passed the Colorado River Basin Salinity Control Act (P.L. 93-320) in 1974. That Act consists of two titles. Title I addresses the water quality programs which are needed to fulfill agreements between the United States and Mexico. Title II of the Act deals with those measures upstream of Imperial Dam which will reduce salt loading to the river.

Since the passage of the Act in 1974, eight years of experience has been gained with the completion of several planning studies, the acquisition of considerable base-line data, and the initiation of two of the salinity control projects originally authorized by the Act. Based upon this experience, it has become evident that Title II of the Act needs to be updated and expanded to reflect the newer information and greater understanding which we now have. S. 752 does just that.

S. 752 would make four main amendments to Title II of the Act:

(1) Six new salinity control projects would be authorized for construction by the Department of the Interior, including joint ventures with non-federal entities to demonstrate saline water use technologies,

(2) The Department of Agriculture would be authorized to implement a voluntary cooperative program of technical and cost-sharing assistance for private land owners in order to improve on-farm water management practices,

(3) The Bureau of Land Management, Department of the Interior, would be authorized to develop a program to minimize salt loading from lands which it manages, and

(4) There would be miscellaneous changes to various provisions of Title II, which changes are needed to clarifiy the authorities and procedures for the execution of the salinity control program.

Colorado has a major interest in S. 752. First, we are working together with the other states and the federal government to address the salinity problem through the agreed upon basinwide approach while we continue to develop our compact apportioned waters. Secondly, Colorado is the state in which: (1) three of the six newly authorized and two of the already authorized projects are located, (2) a large portion of the Department of Agriculture on-farm program will be carried out, (3) much of the land in the basin which is under the jurisdiction of the Bureau of Land Management is located, and (4) some of the larger sources of saline water for industrial use are found.

In light of the fact that a very large portion of the salinity control program occurs in Colorado, local water users have taken a particular interest in the provisions of S. 752. I can report to you their general support for this legislation, although there are certain details yet to be resolved on the specific projects and programs in Colorado. However, we anticipate that these details can be worked out to the mutual satisfaction of all involved.

Indeed, this legislation is needed in order that these matters can be resolved. For example, the on-farm program carried out to date in the Grand Valley in Colorado has proceeded on the basis of existing authorities not tailored to the needs of the salinity control program. S. 752 would specifically authorize the on-farm component of the salinity control program, thereby providing a statutory framework within which to solve previously encountered problems.

Another example is the provision which S. 752 makes for the replacement of incidental wildlife values. The 1974 Act did not give authority to the Bureau of Reclamation to implement replacement measures when constructing salinity control units. This has led to some misunderstanding among interested parties and agencies as to what could and should be done. S. 752 clarifies this matter and will provide the basis for resolving such issues in the future.

In summary, Colorado supports the passage of S. 752. We urge your expeditious action in reporting this bill favorably to the full committee with the one requested change.

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SUBCOMMITTEE ON WATER AND POWER

SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES

SEPTEMBER 15, 1983

BILL: S. 752

REQUESTED ACTION:

Approval of legislation to authorize certain additional measures to assure accomplishment of the objectives of Title II of the Colorado River Basin Salinity Control Act.

ATTACHED STATEMENTS FROM:

Governor Richard Bryan
State of Nevada

Resolution 83-6
Colorado River Commission of Nevada

WITNESS:

Jack L. Stonehocker, Director
Colorado River Commission of Nevada

STATEMENT OF THE HONORABLE RICHARD BRYAN

GOVERNOR OF THE STATE OF NEVADA

TO THE

SUBCOMMITTEE ON WATER AND POWER

SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES

PRESENTED BY JACK L. STONEHOCKER, DIRECTOR,

COLORADO RIVER COMMISSION OF NEVADA

SEPTEMBER 15, 1983

S. 752

Mr. Chairman, Members of the Committee, I am Jack L. Stonehocker, Director of the Colorado River Commission of Nevada. The Honorable Richard Bryan, Governor of Nevada extends his regrets. Because he is unable to attend this hearing, he has asked me to provide his testimony concerning S. 752 which authorizes certain additional measures to assure the accomplishment of the objectives of Title II of the Colorado River Basin Salinity Control Act included in P. L. 93-320.

Nevada's representatives on the Colorado River Basin Salinity Control Forum have kept me closely briefed on matters relating to the Colorado River, and I support the testimony that has been presented to you by the Honorable Bruce Babbitt, Governor of the State of Arizona. I have been informed his testimony represents the position of the seven Colorado River Basin states through the Salinity Control Forum. His testimony clearly identifies the importance of S.752 to the successful implementation of amendatory legislation necessary to assure that the water resources of one of our nation's greatest rivers are developed with prudent safeguards prescribed for the maintenance of water quality objectives set forth in P.L. 93-320.

The State of Nevada relys heavily on the Colorado to meet its rapidly growing municipal and industrial water demands. Approximately 70 percent of Southern Nevada's current water demands are met by Colorado River water. Soon after the turn of the century, approximately 90 percent of Southern Nevada's water demands must be satisfied by the Colorado River. That translates into a population of 750,000 to 1,000,000 people who will look to the Colorado as their primary potable water supply. I am advised the amendatory salinity control legislation, as reflected in S. 752, is absolutely necessary if the water quality objectives of P.L. 93-320 are to be implemented in time to meet the needs of our citizens.

I wish to stress Nevada's present and future water resource needs are not altogether unique to those of the other Colorado River Basin States. I reference Nevada only to emphasize, from our local perspective, the urgency and need for your favorable action on S.752. Indeed, a commonality of purpose among the seven Basin States is reflected in the testimony submitted to you by Governor Babbitt.

Mr. Chairman, I believe the importance of S. 752 deserves the full attention of you and your colleagues to move this bill through Congress. Thank you for your interest and your efforts on our behalf.

83-6 RESOLUTION

COLORADO RIVER COMMISSION

WHEREAS, P.L. 93-320, commonly known as the Colorado River Basin Salinity Control Act, was authorized by the United States Congress on June 24, 1974 and provided for the construction, operation, and maintenance of certain works in the Colorado River Basin to control the salinity of water delivered to users in the United States and Mexico; and

WHEREAS, an amendment to this Act is necessary to further authorize certain additional measures to assure accomplishment of the objectives of Title II of such Act, and for other purposes; and

WHEREAS, said additional measures and other purposes are generally identified as follows:

1. Authorization of six new salinity units to be constructed within the funding ceiling established in the Act.
2. Improvement of a large network of canal and lateral systems, with everything but the salinity benefits being reimbursed to the Federal government by the water users who benefit.
3. Replacement of incidental wildlife or other environmental values that may be impaired due to construction of salinity control projects.
4. Implementation of a more streamlined and effective on-farm control program through the Department of

Agriculture which will be entirely voluntary in nature and pursued cooperatively with private land owners; and

WHEREAS, Senate Bill S. 752 and House Bill H.R. 2790 have been introduced in the United States Congress and will appropriately amend Title II of the Act as described herein.

NOW, THEREFORE, BE IT RESOLVED, the Colorado River Commission of Nevada supports the provisions of Senate Bill S. 752 and/or House Bill 2790 and urges their prompt consideration and enactment; and

BE IT FURTHER RESOLVED, a copy of this Resolution be sent to Governor Richard H. Bryan, Senator Paul Laxalt, Senator Chic Hecht, Congressman Harry Reid, Congresswoman Barbara Vucanovich, and United States Secretary of Interior James G. Watt; Senator James A. McClure (Chairman, Senate Committee on Energy and Natural Resources); Congressman Morris K. Udall (Chairman, House Committee on Interior and Insular Affairs); Senator Frank H. Murkowski (Chairman, Senate Subcommittee on Water and Power); Congressman Abraham Kazen, Jr. (Chairman, House Subcommittee on Water and Power Resources); and Commission Robert N. Broadbent, (U. S. Bureau of Reclamation).

Adopted and passed at a regular meeting of the Colorado River Commission of Nevada on September 2, 1983.

JACK LEHMAN, CHAIRMAN

Statement
In Support of S. 752
to
SUBCOMMITTEE ON WATER AND POWER
of the
SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES

September 15, 1983

By
Carl L. Slingerland
New Mexico Interstate Stream Commission

My name is Carl L. Slingerland. I am testifying today on behalf of Mr. S. E. Reynolds, New Mexico State Engineer and the New Mexico Representative on the Colorado River Basin Salinity Control Forum. I am Mr. Reynolds alternate on the Forum, a member of the Colorado River Basin Salinity Control Advisory Council and New Mexico's representative on the Forum's work group.

I am pleased to have the opportunity to present a statement in support of S. 752. New Mexico concurs in the statement submitted to the Committee by Governor Babbitt on behalf of the Seven-State Colorado River Basin Salinity Control Forum.

The Colorado River Basin Salinity Control Forum was formed in November 1973 in response to the Environmental Improvement Agency's request that an interstate organization be established to develop a salinity control plan for the Colorado River Basin.

The Forum has been very effective in bringing together the federal agencies and the seven Colorado River Basin states to help solve the Colorado River salinity problem.

P.L. 93-320, the Colorado River Basin Salinity Control Act was enacted in 1974. Title II of the act authorized construction of four units and directed expedited completion of planning reports on twelve other potential salinity control units.

As a result of technological advancements in salinity control and because several of the salinity control units are now better understood, P.L. 93-320 should be amended in order to bring about the most cost effective salinity control program for the Colorado River Basin.

I want to thank the Committee for considering S. 752 which is of vital importance to the seven Colorado River Basin States and urge its passage.

Testimony
to
SUBCOMMITTEE ON WATER AND POWER

of the
SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES

September 15, 1983

by
Daniel F. Lawrence
Interstate Streams Commissioner for Utah
in Support of
S. 752

My name is Daniel F. Lawrence, and I am the Director of the Utah Division of Water Resources and Interstate Streams Commissioner. The statement I will give has been approved by Governor Matheson, and can be taken as the position of the State of Utah on S. 752, Amendments to the the Colorado River Basin Salinity Control Act.

Utah has been heavily involved in the Colorado River salinity issue since it began to be seriously recognized in 1968. I personally have been a member of the Colorado River Basin Salinity Control Forum since its inception in 1973 and a member of the Colorado River Basin Salinity Control Advisory Council since its organization in 1974. I have seen the Forum unite the seven Basin states for the first time to address a common problem and propose solutions technically, economically, and politically acceptable to all.

One of the most significant accomplishments of the Forum and seven Basin states was the formulation and passage of Public Law 93-320, the Colorado River Basin Salinity Control Act. This Act was noteworthy for its implicit recognition of salinity control as in large part a Federal obligation, and also in its innovative approach to State-Federal and Upper-Lower Basin cost-sharing. Enactment of this bill into law demonstrated conclusively that the Basin states and the federal government could come to agreement on the difficult questions associated with salinity control on the Colorado River.

Nine years have passed since passage of Public Law 93-320, and changing conditions have made amendments to the Law imperative.

We think that the single-purpose cost-effectiveness approach for determining relative priority among the various projects is justifiable, and will insure maximum return on salinity control dollars. We also feel strongly that the salinity control projects should be exempted from the Principles and Standards. Analysis under the Principles and Standards has proven useful for traditional water development projects. However, where the only goal is water quality improvement, and where federal regulations require water quality standards to be met, we feel the application of the Principles and Standards to be superfluous.

In Utah, the USDA Uinta Basin Unit has been extremely effective and popular with the local farm operators. We are very supportive of the changes in S. 752 relating to the agricultural-related units and also believe that the new provisions protecting incidental wildlife values will make the units much more acceptable to wildlife interests.

These and other portions of the legislation now before you are the culmination of many months of discussions and negotiations among Administration officials and representatives of the seven Colorado River Basin states. Although we in Utah have had to make compromises in some areas, we feel that these have produced a stronger bill and one that will be more acceptable to diverse interest groups.

The record of Utah on control of Colorado River Basin salinity is clear, from initial leadership in 1973 of the Salinity Control Forum to the publication in 1982 of a State salinity strategy. It is our feeling that these amendments to the Salinity Control Act are a logical and necessary extension of past efforts to accomplish the purposes of the Act in an expeditious and cost-effective manner. We urge passage of S. 752.

Mr. STEINER. We'll only submit one brief testimony and then we'll be prepared to respond to your questions.

The current level of salts in the flows of the Colorado River result in annual damages to U.S. water users of $120 million. If salinity control measures are not implemented by the year 2020 to control the increase in the salinity that will result from man's increased use of the river, the level of damages will almost double to $238 million per year.

Approximately 9 million tons of salt reach Lake Mead each year. By the turn of the century more than 2 million tons of salt must be removed or prevented from entering the river annually if current salinity levels are to be maintained. Now this is a tall order, one that the seven Colorado River Basin States working as the Colorado River Basin Salinity Control Forum, after almost a decade of efforts to control salinity under the authorizations of the 1974 act have determined necessitates that this important act be modified and updated.

Over the last 2 years the Basin States have developed amendatory legislation and are now in unanimous agreement as to the modifications that need to be made. The seven Colorado River Basin States support S. 752 as introduced with only very minor technical changes. And I'm pleased to advise that all 14 of the Basin State Senators have cosponsored this legislation.

S. 752 would authorize the Secretary of the Interior to spend the funds that were authorized in the act of 1974 on a total of 10 salinity control units, including the four originally authorized by the act. The selection of the larger number of salinity control units is based on extensive studies by the Department of the Interior and will allow the Secretary flexibility in determining where the funds can be spent most cost effectively. It is not intended that every component of every one of the units be constructed as some will be found to be less cost effective than others. Let me emphasize the bill does not increase the total amount of funds authorized to be expended by the Secretary of the Interior by the original act in 1974.

The proposed legislation would establish a new program in the Department of Agriculture which would allow that Department, on a voluntary cost-share basis, to offer assistance to farmers in the improvement of irrigation practices. We have learned over the last decade that some of the most cost-effective salinity control strategies involve technologies that the Department of Agriculture can best advance as onfarm improvements in agricultural practices. S. 752 would authorize the Department of Agriculture to create this new program, write rules and regulations that will be especially tailored to the needs of the salinity control program on the Colorado River, and to spend, through fiscal year 1989, up to $186,600,000 on cooperative cost-sharing ventures. We anticipate that the farmers will spend up to $50 million and countless hours as their share in implementing the program.

The regional approach that is at the heart of the proposed new agricultural program is noteworthy. Upstream irrigators will modify farming practices that have been in place for more than half a century. An irrigator for example in the Grand Valley in Colorado will invest his money, his time and his effort to do a

better job of farming so that water users in southern California, central Arizona, on the Indian reservations along the river and in Mexico can be spared the adverse impacts that would otherwise accompany the deterioration of the quality of their water supplies. The proposed legislation provides for a sharing of cost. The end result is that the entire basin will benefit as some of the most cost-effective programs are implemented on private land on a voluntary basis.

The salinity control program as authorized in 1974 included State cost-sharing provisions. The legislation before you today continues these provisions with the two basin power accounts paying back 25 percent of the Federal costs. The States shares are raised through incremental charges for energy developed on the Colorado River. In this way the States will pay more than $100 million for salinity control. S. 752 would continue 25 percent cost sharing in the Department of the Interior's program and would authorize identical cost sharing for the Department of Agriculture's program.

On behalf of the State of Arizona and the seven Colorado River Basin States, I want to thank this committee and you Mr. Chairman, for the attention that has been given to this important legislation. In the short term, we offer the cooperation and support of the States and the forum and its staff to assist the Congress as it considers this legislation. In the long term, we offer a State/Federal partnership in the implementation of this most important water quality control effort. The panel of States representatives stand ready to answer any questions that you may have, Mr. Chairman.

Senator NICKLES. Thank you very much, Mr. Steiner. And I'll ask questions and if others care to answer the question then that is fine.

You heard Mr. Siegel mention the Department not having specific amounts of authorization in the bill. I think you called for what, $180 million.

Mr. STEINER. $186,600,000.

Senator NICKLES. Which is considerably more than what is being spent now or even proposed. We're talking about doubling from $5 million up to $12 million now. But they were looking for some flexibility, not having those higher amounts.

Where did you get those dollar figures?

Mr. BARNETT. Those numbers are out of Soil Conservation Service studies, and reports that indicate the implementation time frame that they feel they can move ahead with. You might recognize that up until this point the 10 areas that Mr. Siegel referred to only in a minor way have in 2 of the areas implementation occurred. The money is used in matching with the farmers the cost-sharing dollars. Those would be forthcoming in the decade ahead. That's the number that came out of their report reflecting those expenditures.

Senator NICKLES. I think they mentioned something like $369 million would take care of the total project if I remember hearing their comments. I'm just wondering where you got those figures.

Also you heard Commissioner Broadbent mention that he didn't think the additional six projects should be authorized until the feasibility studies are completed. Any comments on that?

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Mr. STEINER. We disagree with the Commissioner. Under the administration's new plan policy of first making an appraisal which they have already completed on these projects and then going directly to a construction report, we feel that these projects certainly have been studied at the appraisal level. They are ready to proceed on the basis of congressional approval, congressional oversight. And we feel it's necessary in this program to provide the Department of the Interior a greater amount of flexibility in moving forward with cost-effective increments in the project.

Senator NICKLES. What's the status on the four projects that have already been authorized?

Mr. STEINER. Two of them are under construction. One of them has been deferred on the basis that we found——

Senator NICKLES. Which two are under construction?

Mr. STEINER. Paradox and Grand Valley.

Senator NICKLES. Paradox is where?

Mr. STEINER. In Colorado, as is Grand Valley.

Crystal Geiser has been deferred on the basis that it isn't cost effective. And the Las Vegas Wash is being reformulated at this point in time.

Senator NICKLES. Is that next to Las Vegas?

Mr. STEINER. Yes, it's in the Las Vegas, Nev., area.

Senator NICKLES. Which one was not feasible?

Mr. STEINER. Crystal Geiser.

Senator NICKLES. It's your thought that we should go ahead and authorize those, or should we find out whether or not they're feasible?

Mr. STEINER. We believe they ought to be authorized on the basis of congressional oversight.

If this committee doesn't have, if it finds that the project is acceptable, that we can go without having to go through the formal process of coming to legislation to get those units authorized, the whole new planning process as we understand it is to simplify the administration's process. It's to simplify the whole process of getting projects planned and construction. If we have to come back every time one of these units now is found to be most cost effective, have to come back and get the special authorization, this process, we think that the timeliness of this process would be destroyed and the cost effectiveness of it will be made extremely inefficient.

Senator NICKLES. From the changes that have been made to date, the investments that have been made to date, have you seen some improvements already in salinity control?

Mr. BARNETT. No Senator. I think you need to realize in the decade since the legislation has been enacted there has not been that much implementation. The effects of limited amount of onfarm work the Department of Agriculture has done, the limited amount of work that has occurred only in the Grand Valley and in the case of the plugging of an oil well in the Meager Dome area is not yet enough to measure.

Senator NICKLES. So if Congress went full bore ahead and passed this legislation, what do you think the results would be as far as salinity control? How far or how successful do you think we might be?

Mr. BARNETT. As Mr. Steiner indicated, we can see a need for taking out as much as 2 million tons of salt. The combined programs that we have before you today will not remove that amount of salt, but would, toward, by the end of the decade, by the end of the century, would allow for a reduction of the majority of that. Additional studies are needed. Plans need to be brought back to the Congress for further authorization to remove the full 2 million tons.

Senator NICKLES. That salinity control, you're going to have more success by some of the money going in the irrigation changes as far as seepage is concerned? Or are you going to have more luck as far as the additional reservoirs? You've got your onfarm programs. We're trying to get a little bit better idea in realizing the problem that we have, particularly as the river heads south. Where are the most cost-effective methods in reducing the salinity problem?

Mr. BARNETT. Well Senator, as has been indicated with the previous testimony, we feel that some of the onfarm strategies are immediately available. They are some of the most cost effective. On the long term as I just stated, we still do not have plans to remove all of the 2 million tons and so we feel we need to look at all of those options that you've indicated and work ahead with each of them as they are ready and work ahead with the one that is then the most cost effective.

Some of the point sources that the Bureau is looking at, particularly in for example the Paradox, looks to be very cost effective. It's a case where springs rise in the bottom of the Delores River. They are very concentrated in salts, and it appears it's cost effective immediately to remove those, and the Bureau is proceeding with that.

We're looking at all kinds of options. One of which would be authorized by this legislation. It would allow the Secretary of the Interior to cooperate with industry to put some of the saline waters to use rather than trying to find some nonbeneficial disposal of those waters. The details of those industry opportunities are still trying to be worked out but for example perhaps a utility might use saline water in their cooling towers instead of freshwater and hence prevent that saltwater from going to the river.

Senator NICKLES. What was the amount of the original authorization in 1974?

Mr. BARNETT. $125 million. That was then with an escalation clause that brings it in today's dollars at over $300 million.

Senator NICKLES. That's a pretty rapid rate of escalation. Tied to construction costs?

Mr. BARNETT. Tied to the normal indexing of the cost of doing business, the construction costs yes. Inflation rate.

Senator NICKLES. It was $125 and now it's——

Mr. BARNETT. I can't give you a precise number. It's over $300. It changes each year as the economy changes.

Senator NICKLES. You mentioned there are two projects that are in construction now. What were the cost of those two projects?

Mr. BARNETT. I can give you those numbers, the Bureau of Reclamation could. It would take me a minute to pull them out. Paradox and Grand Valley are the two that you are asking about. We can provide you with those numbers.

Senator NICKLES. I'd like those for the record and also the status of the estimated expenses for the third project as well.

Going back to your comment, Mr. Steiner, you're asking for authorization to proceed on the six but not additional moneys and I've seen this 125 go to 300 plus, and I'm wondering how much of those projects you are going to take out of that original authorization, what's left, and what type of future expenses we might be talking about if we're looking at the additional six. You know, we're wrestling with cost restraints as I'm sure you're well aware.

Mr. Barnett, one additional question. You've done a lot of work in salinity control, I assume from your responses. Has all your work been confined to the Colorado River Basin?

Mr. BARNETT. Yes, my employment's been in the Colorado River Basin. That doesn't mean we haven't looked to other areas. In fact there was an international conference on the salinity in Salt Lake this year, so we're trying to keep abreast of other efforts, other technologies.

Senator NICKLES. Are there some technologies that are coming forth that can be made, that can be helpful and also cost effective?

Mr. BARNETT. I think the use of irrigation, agriculture technologies on farm improvements to its fullest. You'd have to view it as being right on the front edge of technology. I think that looking at ways industry might use saline water is right on the cutting edge of technical advances. Some of the ways that you might collect saline seeps and confine them and dispose of the water that the Bureau is working with is also right out front.

I think when the Bureau was assigned this task a decade ago they were asked to pioneer.

Senator NICKLES. When you find that a river or stream, or an underground aquifer has a very high salinity content, are there methods that can be employed, in the form of diversions or evaporation ponds, or something like that, that might be of assistance? Is that part of this project?

I'm a little familiar with some of the other technologies that have been tried.

Mr. BARNETT. There are ways to change the ground-water flow in an aquifer system so that perhaps the saline waters will not reach the surface. That's being looked at. That's part of the technique at the Paradox project of the Bureau. Waters obviously can be diverted and evaporated. That technology is not hard to understand.

Within the Colorado River Basin the States have concluded that to take saline waters and evaporate them puts those waters to no beneficial use. We have such a limited water supply that we want to explore every opportunity to use those waters before they might just be disposed of without beneficial use.

Senator NICKLES. Gentlemen, any additional comments from other panelists that you wish to make?

If not we appreciate your attendance and also your expertise on this legislation.

Thank you very much.

Mr. STEINER. Thank you Mr. Chairman.

Senator NICKLES. Our next panel is Harry Laffoon, vice chairman, Colorado River Indian Tribes, Parker, Ariz.; John Porter, Dolores Water Conservancy District and Montezuma Valley Irrigation

Co.; Garth Sorenson, farmer, Roosevelt, Utah; Ira McKeever, president of Western Mining Operations, W. R. Grace Co., Denver; Keith Ainsworth, assistant general manager, Coachella Valley Water District; and James Krieger, director of contract administration, Metropolitan Water District of Southern California.

Mr. Laffoon, please proceed.

If our panelists could keep their remarks limited because we're kind of running overboard a little bit.

STATEMENT OF HARRY LAFFOON, SR., VICE CHAIRMAN, COLORADO RIVER INDIAN TRIBES, PARKER, ARIZ.

Mr. LAFFOON. I only have a short statement.

Mr. Chairman, members of the subcommittee, my name is Harry Laffoon, Sr. I am vice chairman of the Colorado River Indian Tribes of the Colorado River Indian Reservation. I am very pleased to have the opportunity today to present testimony on behalf of the Colorado River Indian Tribes in support of S. 752, amendments to the Colorado River Basin Salinity Control Act.

The Colorado River Indian Reservation comprises approximately 278,000 acres spanning the lower Colorado River, adjacent to the States of Arizona and California. The Colorado River is the mainstay of the reservation economy, providing the basis for the agricultural and recreational industries on the reservation. It is, of course, our only source of water.

The Colorado River Indian Tribes have diversion rights to nearly three-quarters of a million acre-feet of water from the mainstream of the Colorado River per year. Approximately 80,000 acres of reservation lands are currently under irrigation. The principle crops grown are alfalfa, cotton, wheat, lettuce, cantaloupes, other melons, and onions, with a combined crop value of approximately $60 million per year.

The increasing salinity of the Colorado River water has a major impact on the reservation economy, as well as on the health of the reservation populace. The tribes share in the millions of dollars of economic damages being suffered annually due to the salinity of the Colorado River. Without effective salinity control, these economic damages will significantly increase, affecting not only the tribes, but all persons within the reservation whose economic livelihood is tied to the agricultural industry, whether directly or indirectly. Further, current health problems can be expected to worsen if the salt levels of Colorado River water continues to increase.

S. 752, if enacted, will offer a basinwide cost effective approach to halting the ever increasing salinity of the Colorado River. On behalf of the Colorado River Indian Tribes and the entire reservation populace, I strongly urge the passage of S. 752.

Mr. Chairman, this concludes my testimony. I wish to thank you for the opportunity to present this statement on behalf of the Colorado River Indian Tribes.

Senator NICKLES. Thank you very much.

Mr. Porter.

STATEMENT OF JOHN PORTER, MANAGER, DOLORES WATER CONSERVANCY DISTRICT AND MONTEZUMA VALLEY IRRIGATION CO., CORTEZ, COLO.

Mr. PORTER. Mr. Chairman, I appreciate the opportunity to appear today. I am testifying as a farmer on behalf of the Montezuma Valley Irrigation Co. In addition, Mr. Chairman, I'd like to enter testimony from the Grand Valley Water Users Association of Grand Junction.

I have a brief two page statement and to make that briefer I'd like to testify specifically to two unique portions of the McElmo Creek salinity unit that I want to call your attention to.

The Towaoc Canal is the planned delivery system for the reclamation of water for the Ute Mountain Ute Indian Tribe. With the aid of S. 752 the potential of combining the Towaoc Canal with the revampment of the Montezuma Valley Irrigation Co. Highline Canal, this would save about $9 million in construction costs. It would save about $50 million annual O&M costs, but more importantly it would eliminate the inconvenience and ill feeling caused by a new canal traversing the Montezuma Valley.

The second point, we think the terrain of McElmo Creek drainage area is such that there is a potential for a fully gravity pressurized underground lateral system for approximately 10,000 acres of the Montezuma Valley. The local feeling is that the voluntary use of the SCS and their onfarm program would be greatly enhanced if this could be the case. And so S. 752 provides for the comprehensive cooperative study of SCS and USBR. So we urge passage of S. 752.

[The prepared statements of Mr. John Porter and the Grand Valley Water Users Association follow:]

Statement of
John Porter
Montezuma County, Lewis, Colorado

FARMER
Montezuma Valley Irrigation Company System

MANAGER
Dolores Water Conservancy District

before the
SUBCOMMITTEE ON WATER AND POWER
COMMITTEE ON ENERGY AND NATURAL RESOURCES
UNITED STATES SENATE

Concerning S. 752
September 15,1983

Introduction

I am testifying today as a farmer, and also on behalf of both the Montezuma Valley Irrigation Company, and the Dolores Water Conservancy District. In addition, I would like to request your permission, Mr. Chairman, to include into the record written testimony from other farmers and farmer groups from the Colorado River drainage area of Colorado.

The Montezuma Valley lies in Southwestern Colorado. It has been irrigated since 1895 by diverting water from the Dolores River Basin. Mancos shale underlies one half of the valley, thus through natural drainage and irrigation return flow, 119,000 tons of salt are transported into the river system.

Summary of Statement

The water users in the McElmo Creek drainage support and urge you to enact S. 752.

In addition to the obvious reasons for instituting a salinity control program in the McElmo area, I would like to bring your attention to two other reasons; a: Co.operating with the Dolores Reclamation Project in relocating the Towaoc Canal; and b: Studying the feasibility of encompassing the entire salty area of the McElmo drainage in a gravity pressurized lateral system.

1st of 2 pages (con't.)

(con't.) S. 752-Porter- 2nd of 2 pages

Testimony

This committee has received testimony from, J. William McDonald, Director of the Colorado Water Conservation Board, outlining the need for and the benefits of S. 752. I will not belabor you with additional testimony in that regard, except to say that we in Southwest Colorado wholeheartedly support S. 752 for the same reasons.

In addition, S. 752 is important to us for the two specific reasons previously mentioned. I would like to elaborate on those items.

The Towaoc Canal is to be the delivery system for Dolores Project water to the Ute Mountain Ute Indian Tribe. With the aid of S.752, the potential of combining the Towaoc Canal with the revampment of the Montezuma Valley Irrigation Company Highline canal, which is part of the McElmo Salinity Project, is a possibility. This would save an estimated $9 million in construction cost, $50,000 annual savings in O&M costs and more importantly it would eliminate the inconvenience and ill feeling caused by a new canal traversing the Montezuma Valley.

The terrain of the McElmo Creek drainage is such that there is a potential for a fully pressurized underground lateral system for approximately 10,000 acres. The local feeling is that the voluntary use of the SCS and their "On Farm" salinity program would be greatly enhanced if such were the case. S. 752 provides for the comprehensive study of this alternative by the SCS and the USBR.

Conclusion

On behalf of the Montezuma Valley Irrigation Company,the Dolores Water Conservancy District, the landowners and the farmers affected by the McElmo Creek Unit of the Colorado River Salinity Control Project, we urge passage of S. 752.

STATEMENT BY THE GRAND VALLEY WATER USERS ASSOCIATION, COLORADO

Before the

Subcommittee on Water and Power
Committee on Energy and Natural Resources
United States Senate

In Support of S. 752

Washington, D.C.
September 15, 1983

The Grand Valley Water Users Association operates and maintains the Gravity Division of the Grand Valley Project located in western Colorado. It is one of the earliest Reclamation projects, having delivered its first water from the Colorado River to the irrigators in 1915. Since that time, the project has provided reliable and consistent irrigation service for some 40,000 acres of very productive land, growing a variety of crops. Some of the main crops are peaches, apples, alfalfa, corn, forage, beans, and onions. The Association's indebtedness to the United States for the Gravity Division's original construction has been paid and repayment schedules for two rehabilitation loans are current and up to date with only $1,252,000.00 remaining to be paid.

Beginning in the late 1960's with the Federal Water Quality Control Act and amendments thereto, plus additional environmental oriented legislation and related controls and regulations, it became apparent that users of Colorado River water were facing problems and challenges far different from any experienced to date. This was especially true of the Grand Valley which was being cited as a major source of salt loading to the river.

Over the next several years, a great deal of interest was generated and effort expended in attempting to develop a method and means for salinity control in the Grand Valley with the Grand Valley Water Users Association and other local irrigation and drainage organizations cooperating in every reasonable way. Among its activities, the Association participated in efforts that eventually produced Public Law 93-320, the legislation being considered for amendment at this hearing.

Under Title II, Section 202 of the Act, dealing with the Grand Valley unit, considerable study and investigation was undertaken both on and off Grand Valley farms to develop design and preconstruction data which eventually contributed to the selection of a portion of the Association-operated irrigation system for construction as a demonstration project known as Stage I of the Grand Valley unit. Stage I represents approximately 15 percent of the lands served by the Grand Valley Project.

The Grand Valley Water Users Association and the United States executed a contract dated March 11, 1980, providing for rehabilitation, operation, and maintenance by the Association of the Stage I salinity control facilities to be constructed on the Grand Valley Project.

Construction began on concrete lining of the 360 cfs main canal in late summer of 1980. Through exceptional performance by the contractor, the 6.8 miles of Stage I canal lining with related facilities were essentially completed and in service by the beginning of the next irrigation season on April 1, 1981.

Following the 1981 irrigation season, work was begun on piping 29 miles of laterals flowing from the lined canal to the irrigator's lands. As of June 15, 1983, all of the laterals were piped with follow-up work proceeding and scheduled for completion by October, 1983.

While it is too early to conclusively evaluate the impact of Stage I activities to date on Colorado River salinity, some of the changes that are known to be occurring are:

1. Lands water-logged by seepage from the original unlined canal that was contributing water to the underground salt-laden stratas and which ultimately carried salt to the Colorado River are now drying out and, in some cases, are even capable of being put back into production.

2. A system of wells for monitoring salt-carrying groundwater thought to be stemming from the original unlined canal, are now showing little, if any, water following lining of the canal. The same observation is true concerning certain open drain channels in the vicinity of the canal.

3. With the pipelines installed, similar results to items 1 and 2 above are being observed. Even in the absence of complete scientific documentation, it can be logically stated that because water is not ecaping from the lined and piped ditches, it is not available to seep into the salt-bearing underground stratas and carry salt to the river. A pre- and post-construction monitoring network has been established in Stage I to measure salinity reduction and impacts to wildlife.

In addition to salt abatement directly achieved by lining and piping of canals and laterals, it should be strongly emphasized that existing canal and lateral systems are incapable of effectively serving new, modern, and sophisticated water application systems for on-farm use as proposed by the salinity program to maximize irrigation efficiency on the farms and

thereby help reduce salt loading to the Colorado River. Therefore, off-farm irrigation systems improvement plays a vital role in implementing on-farm irrigation efficiency with its widely recognized salinity abatement benefits.

As is usually the case in any major undertaking, experience gained along the way often shows there is need for additions or deletions to original planning, as in this case there is need to amend the Colorado River Basin Salinity Control Act as provided by S. 752. Having been a party to salinity control in the Colorado River as previously recited and as operator of the irrigation system on which the first systems improvement construction under the salinity program was undertaken, the Grand Valley Water Users Association believes that favorable results can be achieved in the abatement of Colorado River salinity by pursuit of the programs authorized by the Colorado River Basin Salinity Control Act as would be amended by S. 752. We sincerely solicit your prompt and favorable vote on S. 752 as well as your support for the entire salinity control program whenever possible.

Summary

In summary, we support S. 752 as now written. The amendments are needed to provide:

1. Flexibility in lining canals or laterals or placing them in pipe as conditions warrant.

2. Specific language to address wildlife mitigation.

3. Authorization of other salinity control units.

4. Support and funding for the Department of Agriculture's on-farm programs.

Thank you for the opportunity to make our views known on this important issue.

/bm

Senator NICKLES. Mr. Sorenson.

STATEMENT OF GARTH SORENSEN, FARMER, ROOSEVELT, UTAH

Mr. SORENSEN. Thank you.

Mr. Chairman, I am Garth Sorenson. I am a cooperator with the Uintah Basin Soil Conservation District. I live in the city of Roosevelt in Utah.

I own a 63-acre farm. I also operate and manage four other farms that total 842 acres. In addition, I do the cutting, baling, and hauling of alfalfa on another 285-acre farm, so I farm a total of 1,190 acres.

Now, in order to make a living I also teach auto mechanics 8 hours a day for the vocational center and at night teach shop classes for the adult vocational education program.

I serve in a leadership position for about 500 members of the LDS church and I am a member of the city council. So I don't have much time to worry about bad irrigation systems or poor agricultural practices.

I was raised on a farm in central Utah where agriculture became a part of my life. I still own ground in Scipio, Utah. When we moved to the Uintah basin, I was surprised and disturbed by the amount of agricultural ground that had turned white. I had seen some salty ground before in my younger days on the farm and had watched my dad successfully control the salt by putting on only the water needed for the crops.

I found out that the soil in the Uintah basin is mostly underlaid with shale, which is full of salt. I then realized that the application of irrigation water was extremely critical, too much water was worse than not enough.

When I bought my farm it was with visions of what it could be rather than what it was. May I briefly describe it. There were four ditches meandering across the 63 acres. The uneven ground had high spots that were white because the irrigation water could not flow over them and wash away the salt. The low spots were boggy and would only grow salt grass or nothing. The canal and ditches supplied water that turned up salty when it came up in my fields. I couldn't drive the truck over most of the ground because it stayed so wet. That first summer I harvested two pickup loads of barley.

I went looking for ideas and ended up talking to the SCS. I learned more about irrigation water management but found it hard to follow on my farm ground. In 1980, the first year of the salinity control program, I applied for cost sharing. The SCS planner and I went over the alternatives for keeping the salt down below the root level and at the same time not washing the salt through the soil back into the stream system. I chose to install a sprinkler system and the SCS helped me learn how to run it correctly.

I now raise as much on 1 acre as I did the first year on my whole farm. I can drive my truck anywhere I need to go and none of my ground is white or unproductive. I feel we are successfully controlling the salinity problem.

My neighbor, who I tried to talk into the program but couldn't, said it would never work. He is still having a hard time believing what he sees. His land is as white as it ever was, but I think he'll

come around. A couple of my neighbors in the salinity program say they don't know why they ever waited so long before signing up. They rave about their sprinkler system and what has happened to their ground.

But there are some problems in the program that I think are slowing things down.

One is the problem of requiring a neighbor to be in the program before you can receive a $10,000 a year cost share payment. This is called a pooling agreement. If none of your neighbors participate, you are only allowed a $3,500 a year payment, which doesn't go very far toward an irrigation system. Some of the farmers are a little reluctant to participate because they think they are too old to start something new, or financially the time is not right, or they are Ute Indians, or they lease Ute ground and the tribe has so far not participated.

Another problem is the $10,000 yearly limit. If you were putting in a sprinkler system and needed to use the full cost share amount of $35,000 it would take you 4 years to complete the project. Only $10,000 can be used in 1 year. Now while a fourth of the sprinkler system is being installed the rest of your farm still has to be flooded through the open ditches or not farmed at all. This pretty well disrupts the farm operation and puts off good water management for 4 years.

If the $10,000 yearly limit were removed, the $35,000 could be used in 1 year, then better management and salt reduction could happen a lot quicker.

My neighbor is right in the middle of this next problem which is the $35,000 cost share allowance per long-term agreement. His farm is a little over 400 acres; $35,000 puts a system on about 80 to 90 acres. He is now on his second LTA. His sprinkler system is going in at the rate of $10,000 per year with the $35,000 per LTA. So this will take him 18 years and five LTA's to finally complete the sprinkler system for his 400-acre farm. It takes about 400 acres to support a full-time farmer.

Why not cost share at the rate at which he can meet his financial obligation and install the irrigation system as rapidly as possible?

Another big problem in my area is that this cost-share money can't be used by the irrigation canal company even though the only shareholders in the company are the farmers along that canal.

I am on a 4-mile stretch of canal that has pipe running parallel to the entire length of the canal ditch. But the pipe is only used for onfarm use. It starts and stops at each farm boundary. Each pipe segment was put in by each individual farmer for his own system at different times during the past 4 years.

If the canal company could have cost shared and installed a complete pipeline, most of us could have a gravity sprinkler system rather than having to pump. Also, with a complete pipeline, the company could save 25 percent of its water which is now being lost through seepage. This seepage water really contributes to the saltiness of the ground wherever it comes up.

This next problem concerns the Ute Indian land and the Ute canals. When the reservation was opened up to white settlement, the Indian ground was scattered and mixed in with the rest of the

farmland. These 40-acre pieces turn up everywhere. They wanted the Utes to be neighbors to everyone. The Utes also own canals which deliver irrigation water to white and Indian ground. The problem is the Utes are not participating in the salinity control program. They need to be in the program if we are going to meet our goals of controlling salinity.

I have mentioned problems that I think are slowing down the process of getting the salt under control but the picture is not all bleak, there are a lot of pluses. The enthusiasm of the farmers is generally good. The working relationship between the farmers and the Government agencies is good. There have been a lot of good irrigation systems put in and a lot of good management is now being utilized. However, I think the process can be improved. The ASCS office is doing a good job of disbursing this cost-share money. But when they use the national ACP program regulations this accelerated salinity program seems bogged down. I feel that this legislation S. 752 will smooth out the policy problems so that we can concentrate on the salinity program.

I encourage you to expedite this legislation.

Thank you.

STATEMENT OF IRA E. McKEEVER, PRESIDENT, WESTERN MINING OPERATIONS, W. R. GRACE & CO., DENVER, COLO., ACCOMPANIED BY JOHN THURMAN, CORPORATE VICE PRESIDENT; AND ELIZABETH SURGES-MURRAY, EXECUTIVE ASSISTANT

Mr. McKEEVER. I'm Ira McKeever, president, Western Mining Operations, W. R. Grace & Co., and president of Aquatrain, Inc., Denver, Colo. With me today is Mr. John Thurman, the vice president of our W. R. Grace Washington office.

I'm going to be very quick in going through here but I would like to request that the entire text of my testimony be included in the record.

Senator HECHT [presiding]. It will be.

Mr. McKEEVER. We're here today to support S. 752 and specifically three concepts contained in these amendments. One, the need to protect the quality of the Colorado River water; two, to encourage industrial, beneficial use of highly saline water; and three, the need to provide the option of joint public-private sector project for such use.

The Aquatrain concept could be implemented under section 202(a)(9), pages 3 and 4 of S. 752 which would authorize the Secretary of the Interior to work with the private sector in utilizing Colorado River saline water for industrial purposes. A briefing document describing the Aquatrain project concepts is appended to my testimony. Also included is a copy of testimony before the House Interior and Insular Affairs Subcommittee on Mining, Forest Management, and the Bonneville Power Administration delivered March 26, 1983, describing the needs of western coal producers for a coal transport system like Aquatrain.

The Aquatrain project, as currently envisioned, proposes an underground, multiple pipeline system carrying saline water, coal, and potentially other commodities, possibly from as far north as

Wyoming to markets in the Southwest United States or to a point on the Pacific coast for export.

The primary objectives of Aquatrain are to collect the saline water in the Colorado River Basin, transport it to the closest points of the most beneficial use, and dispose of it in the least-cost manner. To provide an economically competitive method of moving coal and other commodities from source points to markets.

An anticipated result of these combined objectives is to minimize the costs of energy from new coal-fired electric utility powerplants by providing low-cost delivery of superior grade coal and/or a coal product and by making saline water available for powerplant cooling purposes. This will reduce the use of gas and imported oil for firing powerplants and conserve those resources for other, more beneficial uses, and reduce the use of fresh water for powerplant cooling. Improved air quality might also result as new coal-fired powerplants are built in remote rather than metropolitan areas and as new coal cleaning and combustion technologies are employed.

Aquatrain would differ dramatically from a coal slurry pipeline. The coal would first be crushed. A chemical compound, liquid carbon dioxide, would be used to slurry the coal and possibly other commodities in the buried pipeline system. Powerplants would receive coal that is already crushed, eliminating a step in their processing.

Domestic markets for 30 million tons of coal per year exist along the proposed corridor routes, that energy being used to replace current oil- and gas-fired power generation. In addition, at a port facility on the Pacific coast, coal could be exported to foreign markets, such as Pacific-rim countries.

Staged construction is being considered for the project to match investments with coal market demands and coordinate use of salt water with schedule requirements for salinity control. As now envisioned, implementation of Aquatrain would begin with a 14-mile demonstration unit followed by three distinct stages of pipeline construction. Subsequent stages may be added as needed. The demonstration unit would include a technology verification program for design, construction, and operation of a saline water cooling tower, and confirmation of the liquid CO_2/coal slurry technology.

Project costs for coal transport and saline water collection, transport, use and disposal are estimated at $2 to $3 billion—constant 1982 dollars. We feel this capital investment can be obtained from private sources based on contracts for moving coal, coal products, and possibly other commodities to markets. If necessary for project financial integrity, the Federal Government's salinity control program would pay a negotiated share of operation and maintenance costs.

For the project to move forward, formal cooperation with and participation by the public and private sectors are necessary.

We are seeking additional partners in Aquatrain, and are holding numerous meetings with other coal companies, utilities, transportation and engineering companies, environmental interests, and port facility developers.

To this end, private industry and government have opted to involve the public and organized citizen groups in the early stages of

the project. We have met with major national and regional environmental groups on Aquatrain.

Initial meetings have identified a number of concerns, including project impacts in areas directly affecting national interest lands, national parks, national monuments, wilderness areas, et cetera. Equally important though, these groups have indicated a willingness to contribute their ideas in the early planning stage of this project. I hasten to note that such participation does not condition the freedom of respective organizations to independently assess and take action on this project during the regulatory review and subsequent phases.

With respect to S. 752, to make industrial use of saline water, private industry needs the following:

Secretarial approval for such ventures.

Federal participation in planning to assure that project design meets public purposes.

The option of Federal financial participation in the project through salinity control credits; that is, financial participation that reflects the benefits to the Federal Government.

The Secretary should have flexibility in determining the form of such credits in order to assure the public objectives are met and also be relevant to the project.

Whatever the form of salinity control credits, we anticipate that Federal participation would be less than the Government's costs of salinity control through the most cost-effective alternative technology that would otherwise be used, recognizing such other benefits as might accrue to the Federal Government.

Probably the most important aspect of the bill relates to the timeliness of Federal actions. The bill proposes conditional authorization for the Secretary to enter joint ventures for saline water use, with such authorization conditioned on appropriate oversight by the administration and Congress. People in the western States have worked with reclamation in its traditional process of planning and designing projects which classically takes an average of about 15 years. Such timeframes are not acceptable from the viewpoint of private industry. Industry generally works in a much shorter planning and design timeframe, and it appears that the conditional authorization recommended in S. 752 will allow reclamation to work in concert with industry. Without such authority, many of the possible saline water use opportunities will be lost as cost-effective salinity control strategies.

Aquatrain can serve as a model of how government and industry can work together to achieve mutually beneficial objectives. We think it is necessary and timely for Congress to put the Federal Government on track of joint project planning with industry, the States, and citizens.

We therefore support S. 752 and look forward to early enactment.

Thank you for the opportunity to testify before the committee. I would be pleased to address questions you may have.

[The prepared statement of Mr. McKeever follows:]

TESTIMONY
IRA E. MCKEEVER
PRESIDENT, WESTERN MINING OPERATIONS
W. R. GRACE & CO.
AND
PRESIDENT, AQUATRAIN, INC.
DENVER, COLORADO

Introduction

Good morning (afternoon). I am Ira McKeever, President, Western Mining Operations, W. R. Grace & Co., and President of Aquatrain, Inc., Denver, Colorado. With me today is Mr. John Thurman, the Vice President of our W. R. Grace Washington Office.

We are here today to support S.752 and specifically three concepts contained in these amendments: (1) the need to protect the quality of Colorado River water, (2) encouragement of industrial, beneficial use of highly saline water, and (3) the need to provide the option of joint public-private sector projects for such use.

You have heard previous testimony on the problem of Colorado River salinity from Governor Babbitt, Jack Barnett, and others. I endorse their testimony and encourage Congress to enact the proposed amendments to preserve the River's water quality and avoid undesirable environmental, social, and economic consequences in the Basin.

Today, I want to specifically address the proposed Section 202(a)(9) (pages 3 and 4) of S.752 which would authorize the Secretary of the Interior to work with the private sector in utilizing Colorado River saline water for industrial purposes.

Industrial use of highly saline water would:

1. Free large quantities of fresh water supplies for more beneficial uses, thus stretching existing supplies in a water-short region.

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2. Provide for long-term, stable economic growth in the Colorado River Basin.

3. Minimize the cost of saline pollution control to the Federal and State governments.

A project to make industrial use of saline water has been developed from concepts contained in the Bureau of Reclamation report, "Saline Water Use and Disposal Opportunities", dated September 1981. The project - AQUATRAIN - could be implemented under the authority of Section 202(a)(9), if enacted. A briefing document describing the AQUATRAIN Project concepts is appended to my testimony. Also included is a copy of testimony before the House Interior and Insular Committee's Subcommittee on Mining, Forest Management, and Bonneville Power Administration delivered March 26, 1983, describing the needs of western coal producers for a coal transport system like AQUATRAIN.

The AQUATRAIN Project

The AQUATRAIN Project, as currently envisioned, proposes an underground, multiple pipeline system carrying saline water, coal, and potentially other commodities, possibly from as far north as Wyoming to markets in the southwest U.S. or to a point on the Pacific Coast for export.

The primary objectives of AQUATRAIN are:

1. To collect saline water in the Colorado River Basin, transport it to the closest points of most beneficial use, and/or dispose of it in the least-cost manner.

2. To provide an economically competitive method of moving coal and other commodities from source points to markets.

An anticipated result of these combined objectives is to minimize the costs of energy from new coal-fired electric utility powerplants by providing low-cost delivery of superior grade coal and/or a coal product and by making saline water available for powerplant cooling purposes. This will: (1) reduce the use of gas and imported oil for firing powerplants and conserve those resources for other, more beneficial uses, and (2) reduce the use of fresh water for powerplant cooling. Improved air quality might also result as new coal-fired powerplants are built in remote rather than metropolitan areas and as new coal cleaning and combustion technologies are employed.

If all potential opportunities are implemented, the proposed AQUATRAIN collection and transport system would intercept a significant portion of the saline water that enters the Colorado River each year from natural and manmade sources. Along the proposed pipeline routes, there are potential powerplant uses for nearly 200,000 acre-feet of saline water, and emphasis is being placed on identifying those industrial uses that are closest to sources. The system could extract as much as 900,000 tons of the annual salt load required for removal to meet water quality standards and protect the integrity of treaty obligations with Mexico.

Potential saline water uses have been discussed with appropriate representatives of entities that would use the water. Receptiveness to the

concepts has been positive, but conditioned by development of detailed cost and technical evaluations. When such analyses are available, approval and participation by identified users will be sought.

A potential industrial use is in saline water cooling towers. The towers can recycle water with total dissolved solid (salt) concentrations in excess of 100,000 milligrams per liter. Many utilities feel the towers offer significant promise, but long-term demonstration is needed before they can be adopted for general use. The proposed amendments would give the Secretary authority to participate in technology demonstration activities.

AQUATRAIN would differ dramatically from a coal slurry pipeline. The coal would first be crushed. A chemical compound, liquid carbon dioxide (CO_2), would be used to slurry the coal and possibly other commodities in the buried pipeline system. Powerplants would receive coal that is already crushed, eliminating a step in their processing.

Domestic markets for 30 million tons of coal per year exist along the proposed corridor routes, that energy being used to replace current oil- and gas-fired power generation. In addition, at a port facility on the Pacific Coast, coal could be exported to foreign markets, such as Pacific-rim countries.

AQUATRAIN's use of the liquid CO_2 transport technology offers advantages over traditional water-based slurries in addition to the ability to carry much more pulverized coal:

* Water from sources in the Upper Colorado River Basin can be used within the Upper Basin States, eliminating water export which is governed by many laws and compacts. Similarly, Lower Basin water can be used in Lower Basin States.

* Cross-contamination problems associated with coal/water slurries can be avoided.

* A major financial and technological drawback of conventional water slurries--separating coal from the slurry medium--is minimized with CO_2.

* The ultimate water disposal problem is eliminated by a CO_2 slurry.

* Power can be saved by pumping the water only as far as points of use or disposal, rather than to the end of the pipeline if water were used to slurry coal.

Staged construction is being considered for the project to match investments with coal market demands and coordinate use of salt water with schedule requirements for salinity control. As now envisioned, implementation of AQUATRAIN would begin with a 14-mile demonstration unit followed by three distinct stages of pipeline construction. Subsequent stages may be added as needed. The demonstration unit would include a technology verification program for (1) design, construction, and operation of a saline water cooling tower, and (2) confirmation of the liquid CO_2/coal slurry technology.

Project costs for coal transport and saline water collection, transport, use and disposal are estimated at $2-3 billion (constant 1982 dollars). We feel this capital investment can be obtained from private sources based on contracts for moving coal, coal products, and possibly other commodities to markets. If necessary for project financial integrity, the Federal Government's salinity control program would pay a negotiated share of operation and maintenance costs.

Since I spoke before this subcommittee in June 1982, a significant change in AQUATRAIN management has occurred. W. R. Grace & Co. has decided to transfer its lead industry sponsorship role for the project to entities having experience in forming venture consortiums and in building interstate pipelines. A formal offer to effect the transfer is expected to be presented to the Bureau of Reclamation for approval within the month.

For the project to move forward, formal cooperation with and participation by the public and private sectors are necessary.

We are seeking additional partners in AQUATRAIN, and are holding numerous meetings with other coal companies, utilities, transportation and engineering companies, environmental interests, and port facility developers. The participation of U.S. utilities to use saline water and a major part of the coal and/or coal product transported by the AQUATRAIN pipeline system is necessary for project success.

Successful resolution of environmental issues related to a project of this scale depends on continuous and broadly based public participation in the planning process.

To this end, private industry and government have opted to involve the public and organized citizen groups in the early stages of the project. We have met with major national and regional environmental groups on AQUATRAIN.

Initial meetings have identified a number of concerns, including project impacts in areas directly affecting national interest lands (National Parks, National Monuments, Wilderness Areas, etc.). Equally important though, these groups have indicated a willingness to contribute their ideas in the early planning stage of this project. I hasten to note that such participation does not condition the freedom of respective organizations to independently assess and take action on this project during the regulatory review and subsequent phases.

With respect to S.752, to make industrial use of saline water, private industry needs the following:

1. Secretarial approval for such ventures.

2. Federal participation in planning to assure that project design meets public purposes.

3. The option of Federal financial participation in the project through salinity control credits; that is, financial participation that reflects the benefits to the Federal Government.

The Secretary should have flexibility in determining the form of such credits in order to assure the public objectives are met and also be relevant to the project.

Whatever the form of salinity control credits, we anticipate that Federal participation would be less than the government's costs of salinity control through the most cost-effective alternative technology that would otherwise be used, recognizing such other benefits as might accrue to the Federal government.

In addition, with respect to the wording of Section 202(a)(9), I suggest the Committee make clear that the use of the words "to demonstrate saline water use technology and to beneficially use and dispose of saline and brackish waters" (lines 23 and 24, page 3, S.752) refers to both full-scale saline water use projects as well as one-time, short-duration, small-scale efforts oriented toward proving that a particular saline water use technology can work.

Probably the most important aspect of the bill relates to the timeliness of Federal actions. The bill proposes conditional authorization for the Secretary to enter joint ventures for saline water use, with such authorization conditioned on appropriate oversight by the Administration and Congress. People in the western states have worked with Reclamation in its traditional process of planning and designing projects which classically takes an average of about 15 years. Such time frames are not acceptable from the viewpoint of private industry. Industry generally

works in a much shorter planning and design time frame, and it appears that the conditional authorization recommended in S.752 will allow Reclamation to work in concert with industry. Without such authority, many of the possible saline water use opportunities will be lost as cost-effective salinity control strategies.

Conclusion

In conclusion, we think AQUATRAIN is a viable concept and project which has tremendous promise for water quality management and western energy development. It is worth pursuing under the diverse objectives of: least-cost salinity pollution control, orderly development and conservation of mineral resources, air quality standard compliance, provision of long-term fuel needs for new and existing powerplants, and increasing exports of coal-derived products which will improve our balance of payment deficits.

AQUATRAIN can serve as a model of how government and industry can work together to achieve mutually beneficial objectives. We think it is necessary and timely for Congress to put the Federal Government on track of joint project planning with industry, the States, and citizens.

We therefore support S.752 and look forward to early enactment.

Thank you for the opportunity to testify before the Committee. I would be pleased to address questions you may have.

TESTIMONY OF
IRA E. MCKEEVER, PRESIDENT, AQUATRAIN, INC.
AND WESTERN MINING DIVISION, W. R. GRACE & CO.
DENVER, COLORADO

BEFORE THE SUBCOMMITTEE ON
MINING, FOREST MANAGEMENT & BONNEVILLE POWER ADMINISTRATION
HOUSE INTERIOR & INSULAR COMMITTEE

OVERSIGHT HEARINGS ON
THE COMPETITIVENESS OF WESTERN COAL INCLUDING
PRODUCTION, NEW TECHNOLOGY, TRANSPORTATION, FOREIGN EXPORT MARKETS
AND MARKETABILITY

SALT LAKE CITY, UTAH
May 26, 1983

Mr. Chairman, it is indeed a pleasure to appear before the Committee. W. R. Grace & Co. is a coal producer. Together with its partner, the Hanna Mining Company, they own the largest coal mine in the State of Colorado, and hold major undeveloped coal reserves in northwest Colorado near Craig.

I bring to you today a feeling of gloom and a promise of prosperity. The gloom comes from my fear that my company's reserves and the developed and undeveloped reserves of other western coal producers will not be recovered unless a more cost effective transportation system is developed.

The promise I bring is a vision of a new approach to solving the transportation dilemma through a cooperative effort. That approach being a project we have called AQUATRAIN which is a joint venture of private industry, the Seven Colorado River Basin States and the Federal Government. That project has two objectives: control salinity in the Colorado River and solve the coal transport problem.

Before I get into the AQUATRAIN concept, I would like to provide my views of the current transportation dilemma facing coal producers such as overselves.

Today, Grace, and our partners, the Hanna Mining Company, produce coal from our Colowyo Mine near Craig, Colorado. The coal at the mine sells in the railroad car for up to $28 per ton. However, delivery of this same coal to Long Beach, California, in unit trains may add an additional $28 per ton in rail freight rates. The result is a 100% increase in cost to potential export customers before ship loading. During the past five years, rail freights on some shipments have escalated at average annual rates of 20% which results in doubling the rail transportation charges each 3-1/2 years. For comparison purposes, the cost of coal mining has also increased but those increases have been quite similar to the national inflation rate.

We have attempted to sell Colowyo coal in the Pacific Rim Basin. We find however that Australia, South Africa, Poland and other countries are selling coal at a price differential of at least $10 a ton lower than we can provide out of this country. We can see the results of that competitiveness disadvantage in the recent actions of the Board of Harbor Commissioners of the Port of Long Beach, California. In the published draft environmental impact report describing port expansions, that group has scaled down their plans for coal off-loading from 100 million tons per year to 15 million tons per year. A primary factor in that scale down is the current and estimated future inflated rail costs of delivering western U.S. coal to the port in comparison to the expected cost from other international coal suppliers.

I use the export dilemma only as an example. The domestic situation is in fact parallel with the exception that the impacts are visited upon our own people in terms of higher electric power rates. I recently visited with representatives of major southwestern U. S. utilities. Rather than using rail transported coal to meet future needs, the continued and expanded use of more expensive petroleum based fuels is anticipated. In some areas the pass through to customers of fuel transportation costs and the associated long-term energy contracts are being challenged by regulatory bodies and parties to the contracts.

Being tied to an inflation-prone unregulated rail transportation system in the future is even more grim than the present. On February 8, 1983, the Interstate Commerce Commission, through a ruling in a case involving captive shipper coal rate guidelines (Ex Parte 347), authorized rate increases at a rate of 15% higher than the annual inflation rate. The only effective constraint being where a coal shipper could construct a single purpose rail transportation system and show that alternative to be more cost effective. This lack of control on upward freight rates along with the resultant costs on electric power in this country are becoming a severe liability for not only the coal industry but our entire economic and contractual fabric.

But the future is not completely negative. The inventiveness of American ingenuity, in my estimation, is beginning to rise to solve these problems. With the basic problems being the lack of competitiveness in the rail delivery system, the nation therefore has a need for an innovative technology to provide a more cost effective transportation system.

The coal transportation problem is not new to W. R. Grace & Co. When the Colowyo Mine operation was well underway in the summer of 1981, the Grace Company transferred me to the Denver Office to address the situation. Reclamation suggested the concept of using saline water in a coal transport pipeline system as a potentially viable way to meet Colorado River salinity control objectives. The merits of such a marriage between government and industry were immediately obvious to our company. At the suggestion of the Bureau of Reclamation, we approached and received from the Colorado River Basin Salinity Control Forum (representatives appointed by the governors of the Seven Basin States) an endorsement of the AQUATRAIN concepts. With that endorsement

we formally approached the Department of the Interior and, on November 2, 1982, a Cooperative Agreement between Reclamation and Aquatrain, Inc., a wholly owned subsidiary of W. R. Grace & Co., was approved. The agreement encompasses the activities needed to bring us to a point of "Proof of Concept" where the financial, institutional, technical and environmental viability of the project can be determined. At the current time we believe the use of liquid carbon dioxide/slurry technology developed jointly by Grace and Arthur D. Little, Inc., of Cambridge, Massachusetts, offers the most promising coal transport method. Although additional work needs to be undertaken, it also appears that liquid CO_2 can also be used to transport other commodities such as soda ash.

At the current time we are completing the liquid CO_2 coal slurry technology work at the pilot plant level, identifying potential corridors for the pipeline system, and seeking participation from other potential industrial partners. Saline water sources and powerplants to beneficially use those waters have been identified in Wyoming, Colorado, Utah, Nevada, and California. Our very tentative economic analyses suggest that the costs of salinity control through the AQUATRAIN system would be far less than alternative methods and would result in beneficially using rather than wasting the saline water. Depending upon through-put, the first year cost of coal transportation could be lowered by at least one-third that of unit train delivery costs. In addition, the effects of inflation on a system such as AQUATRAIN are far less severe because only about 15% of the cost of an AQUATRAIN type system is subject to inflation whereby more than 50% of rail delivery costs are subject to inflation. The end result for all customers will be a long-term stabilized, predictable, and lower cost of energy to the people of the southwest through levelized costing of rates, while at the same time, addressing the need for controlling pollution in the Colorado River Basin.

Although we currently foresee that the bulk of the coal will be used for domestic power production purposes to reduce the amount of oil and gas now being used for power generation, we continue to be open to collaboration with Pacific Rim countries. We feel that in the long run an AQUATRAIN type system could provide those Pacific Rim countries with the least cost method of meeting their future energy requirements; those energy resources being provided from western United States coal. Over the remainder of the summer, it is our hope to have identified the routing of the system, tentative through-put requirements and locations of associated physical facilities. A map describing the tentative corridors and a description of the status of the project is attached for your ready reference. Construction is anticipated in stages during the 1985-89 period, with the first stage now visualized being an all Utah system connecting the Emery and Carbon County coal fields with the Intermountain Power Project.

In closing Mr. Chairman, I would like to make somewhat of a philosophical observation. For years we have been pushed toward national planning of energy production, distribution and end-use. However, the Federal Government has not effectively undertaken that task, neither has the private sector. My view is that neither by themselves have the wherewithal for that planning activity which is so

essential to our future economic well-being. My greatest satisfaction to date in this AQUATRAIN experience has been the open and continuing dialogue among private industry, government at all levels, and the general public regarding the future needs for Colorado River salinity control, energy production, distribution and end-use in the western United States. Through that dialogue all parties are becoming more knowledgeable and the out-growth of that dialogue appears to be the formulation of a project that can meet both Colorado River salinity control objectives and future energy needs of the western U.S. in both an economic and most environmentally benign manner ensuring the greatest recovery and conservation of our coal resources. The key to that success is the joint venture between government and industry that are working on this project. I commend to this Subcommittee that undertakings such as the AQUATRAIN Project which provides a cost-effective, competitive, and relatively inflation proof coal transportation system is the best method identified so far for assuring the future competitiveness of western United States coal.

Mr. Chairman, I would be pleased to answer any questions the Committee may have.

Salinity Update

U.S. Department of the Interior
Bureau of Reclamation

A Quarterly Report on the
Colorado River Water Quality
Improvement Program

July 1983

Powerplant Cooling Investigations

Discussions are underway with Utah Power and Light for an installation and verification of the saline water cooling tower at Hunter Powerplant. The binary cooling tower (BCT) at McIntosh Powerplant in Lakeland, Florida, currently is the only commercial size facility of its type. Michael B. Bessler of the Water Quality Office and Case L. Legal of Aquatrain, Inc. toured the cooling system facility and reviewed the design problems reported with the BCT.

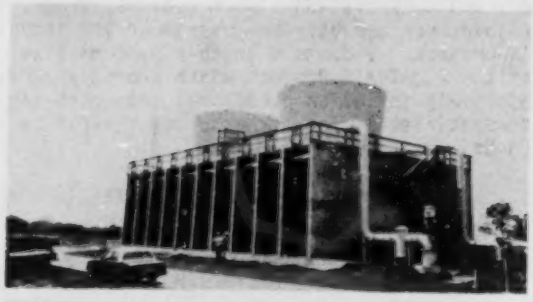
The BCT was being dismantled for repairs and replacement of heat transfer modules. When operating, the BCT at Lakeland provides about 7 percent of the total cooling capacity needed by the 364 MW coal-fired powerplant. Repairs and replacements for the BCT are scheduled to bring the BCT back on line to meet summer operating demands on the plant.

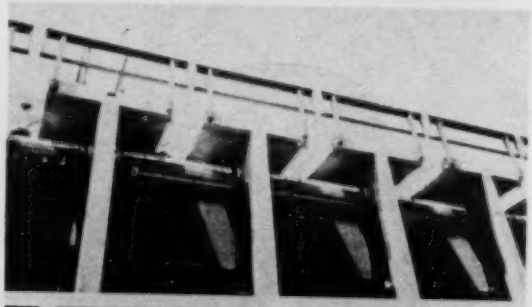
Basically, the BCT serves to concentrate ash pond effluents which average nearly 7,000 mg/L of total dissolved solids. This wastewater is delivered at a rate of 200 gpm (gallons per minute) to the BCT where 192 gpm is evaporated and 8 gpm is blown down to an on-site disposal system. Powerplant cooling water delivered to this BCT is essentially secondary-treated sewage water.

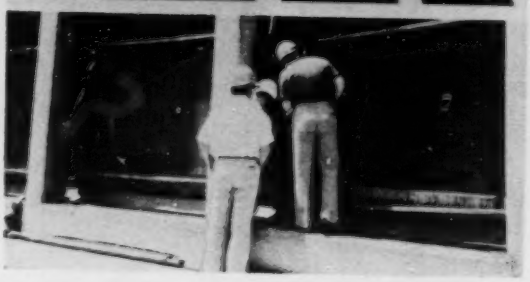
The design problem, as reported and confirmed by inspection, is a mechanical failure in the heat-exchanger. Mylar heat-exchanger sheets (better described as sealed bags) are separated by a 1½-inch diameter, sharp-edged, plastic spacer. Apparently, when the BCT was not operating, because of other plant outages, the wind would cause the vertically hanging Mylar sheets (bags) to vibrate freely in the tower. In addition, during BCT operation, there is some vibration/movement caused by the forced air and thin film waterflow over the Mylar sheets.

The vibration resulted in abrasion and cutting of the Mylar heat-exchanger sheets by the plastic spacer. By running conductivity tests, it was estimated that over 60 percent of the heat transfer modules were leaking because of pinhole-size leaks or tears ranging up to 2 or 3 inches in diameter.

Prescribed repairs and replacements agreed to by Lakeland officials and the BCT manufacturer include







(a) complete replacement of all Mylar bag heat exchangers. The new material will be 5 mil thick as instead of the present 3 mil.
(b) Redesign and replacement of the plastic spacers with a soft elastomer to avoid abrasion and cutting.

All the peripheral subsystems (water treatment softeners, pumps, controls, etc.) were also reported to be satisfactory. No corrosion, fouling, or scaling problems were noted.

It is difficult to draw any specific, technical conclusions because of the limited time of BCT operation. There is no assurance that this design will satisfy all requirements for a saline water cooling tower; therefore, other alternatives or designs will be considered as well as the verification/demonstration program at Hunter Powerplant.

Grand Valley

The draft plan formulation working document identified a best plan which would reduce salinity concentration at Imperial Dam by 15.0 mg/L and result in an overall cost-effectiveness of $585,000 per mg/L. Increments 1 through 13 basically included concrete or membrane lining all laterals in the valley related to the Government Highline Canal and concrete lining the west end of the Government Highline Canal. Increments 14 and 15 include concrete lining the east end and middle portion of the Government Highline Canal.

This plan (15 increments) will comprise the best plan on which a supplement to the Definite Plan Report and an environmental statement will be prepared. Increments 1 through 13 will be an initial phase for immediate construction. The remaining two increments will be a future phase and deferred until they become more competitive with other salinity control opportunities in the Basin.

Other increments with a still less favorable cost-effectiveness would not be included in the best plan or in the environmental statement at this time. However, they could be studied at some future time when implementation of the basin-wide program may make them competitive with other salinity control opportunities.

Preliminary Evaluation

The Water Quality Office recently completed a preliminary evaluation of the ongoing salinity control and related programs in the Colorado River Basin. The analysis compared the effects of the salinity program and the proposed Colorado River Enhanced Snowpack Test (CREST) on the salinity level of the Colorado River.

It was apparent that ultimately, with full basin development, most of the salinity program elements need to be in place and functioning, including a water augmentation program similar to CREST, if the salinity concentration is to be maintained below 879 mg/L at Imperial Dam. Over the long term, the cloud seeding program would have an approximate effect of a 100 mg/L reduction in the salinity concentrations at Imperial Dam.

The Commissioner's office is concerned about the high cost of the full program and its impact on the total Reclamation planning budget. An analysis of various funding levels of plan formulation/advance planning funding was made, also. The concept of the two-stage planning process is to save time and to be effective; however, additional funding demands are placed on the General Investigation (GI) budget. Advance planning activities are started earlier in the process; consequently, a portion of the funds that historically came from the construction budget, following authorization, are now being programmed as part of the GI budget.

There are three ways of addressing this additional demand on the GI budget. One is to reduce and stretch out the GI program by balancing the currently available and anticipated funds into plan formulation and advance planning activities. Another is to move additional funds from other portions of the overall Reclamation budget into the GI account to provide the added funds to take care of the advance planning activities. (With all regions competing for additional advance planning funds, not all programs will receive funds.) The third is to seek additional funds through the Congressional process to carry out an expedited planning and construction process utilizing the two-stage process.

The February 1983 Annual Report of the Colorado River Basin Salinity Control Advisory Council recommendation for the FY 1984 budget was about $13 million for plan formulation and advance planning funding, recognizing the additional funding needs. In preparation of the Reclamation budget, we also recognized the need for additional advance planning funds. However, it soon became clear that the impact of additional advance planning funds for the entire GI program required a reevaluation of all aspects of the planning program. (Reclamation's FY 1984 budget for salinity control plan formulation and advance planning funding is limited to $5,940,000.)

Reclamation is discussing the various options for continuing the salinity control planning program, including full funding, with members of the Colorado River Basin Salinity Control Forum. Under any funding level, Reclamation will continue its close working relationship and program coordination activities with the Department of Agriculture and other agencies as in the past.

Las Vegas Wash

The Bureau of Reclamation's Las Vegas Wash Advanced Water Quality Study will describe current water quality conditions in Las Vegas Wash and will assess probable water quality related impacts associated with proposed alternatives for the Las Vegas Wash salinity control unit.

The purpose of the study is to determine the existence, extent, and mechanisms of nutrient and toxin stripping in Las Vegas Wash under present conditions and under future conditions both with and without construction of the salinity control unit.

Field sampling will be conducted between February and September 1983. The final study report will be due by December 15, 1983.

USDA Report Available

The 1982 USDA Annual Report on the Colorado River Basin Salinity Control Project is now available through Edgar H. Nelson, USDA Salinity Control Liaison Officer, Room 5228, PO Box 2890, Washington, D.C. 20250.

Legislation

Dates for the hearings on the proposed amendments to Public Law 93-320, the Colorado River Basin Salinity Control Act, are being set. The hearings in the Senate with chairman Don Nickles from Oklahoma presiding and the House hearings with chairman Abraham Kazen from Texas are tentatively scheduled the week of July 18. Senator Armstrong of Colorado and Congressman Ray Kogovsek of Colorado have been joined by most of the seven Colorado River Basin States' representatives as cosponsors to Senate bill (S.752) and House Bill (H.R. 2790).

AQUATRAIN

Phase I of the corridor study for the AQUATRAIN Project has now been completed. Working under an Interagency Agreement with the Bureau of Reclamation, the Bureau of Land Management (BLM) has identified a number of potential corridor routes for the pipeline system which is proposed to reduce Colorado River salinity and economically transport western coal to markets. The pipeline is envisioned to start in southwestern Wyoming and terminate 1200-1400 miles away in the Southwest or on the Pacific Coast.

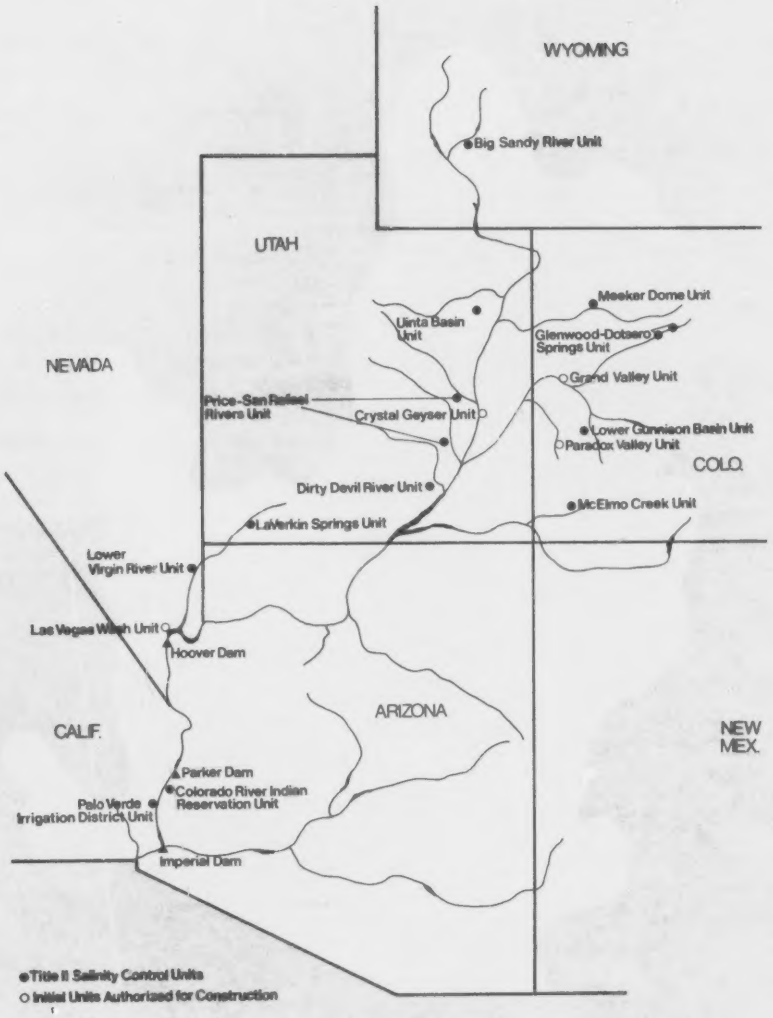
BLM's Division of Environmental Impact Statement Services of the Denver Service Center is leading the effort to find the most desirable pipeline route for AQUATRAIN. Corridor study teams from the Denver office have contacted various BLM and Forest Service offices in Wyoming, Colorado, Utah, Nevada, and California in gathering data for the selection.

The objective of Phase II will be to develop screening criteria based on economic, engineering, environmental, cultural, and social considerations. Input of other Federal agencies will be sought to review the screening criteria, which will then be used to assess identified corridor routes. BLM will submit a final report to Reclamation in August 1983, detailing the work of Phases I and II.

Public involvement is a vital part of AQUATRAIN, and comment is being sought throughout the corridor selection process to help mold the project for the common good. If you would like more information or wish to contribute your views, please contact the Office of Saline Water Transport and Use, ERC-190, Bureau of Reclamation, PO Box 25007, Denver, Colorado 80225, or telephone 303-234-3828.

AQUATRAIN PIPELINE SYSTEM

PROPOSED COMMODITY SOURCES AND POINTS OF USE / MARKETS


WYOMING
Big Sandy River Unit
UTAH
Meeker Dome Unit
Uinta Basin Unit
Glenwood-Dotsero Springs Unit
NEVADA
Grand Valley Unit
Price-San Rafael Rivers Unit
Crystal Geyser Unit
Lower Gunnison Basin Unit
Paradox Valley Unit
COLO.
Dirty Devil River Unit
McElmo Creek Unit
LaVerkin Springs Unit
Lower Virgin River Unit
Las Vegas Wash Unit
Hoover Dam
ARIZONA
CALIF.
NEW MEX.
Parker Dam
Colorado River Indian Reservation Unit
Palo Verde Irrigation District Unit
Imperial Dam
Title II Salinity Control Units
Initial Units Authorized for Construction

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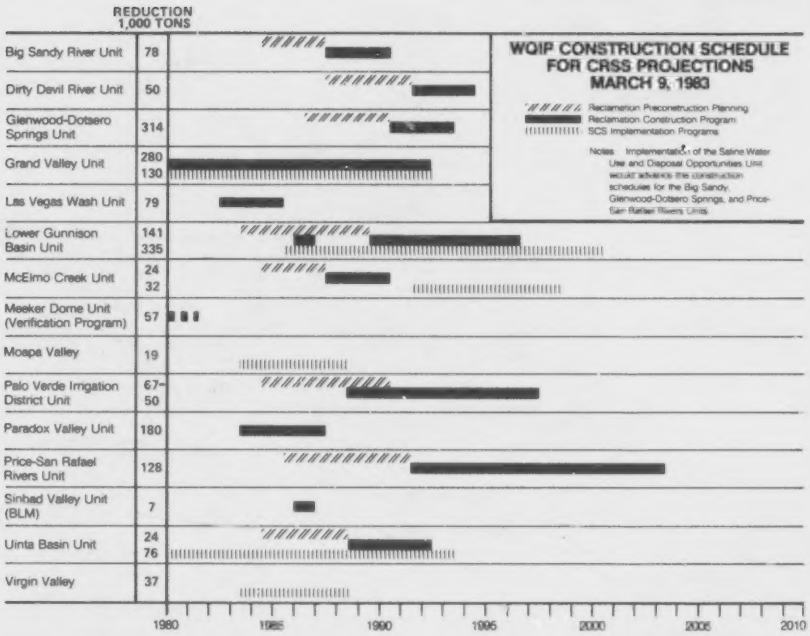


For questions concerning projects discussed in this newsletter, please contact the Public Affairs Office in the Region responsible for that project.

Bureau of Reclamation
Upper Colorado Regional Office
P.O. Box 11568
Salt Lake City, Utah 84147

Telephone: FTS 586-5403
Commercial: 801-524-5403

Bureau of Reclamation
Lower Colorado Regional Office
P.O. Box 427
Boulder City, Nevada 89005

Telephone: FTS 598-7420
Commercial: 702-293-8420

For answers to general questions or items you would like to see included in SALINITY UPDATE, write to:

Editor, SALINITY UPDATE, D-1000
Colorado River Water Quality Office
Bureau of Reclamation
P.O. Box 25007
Denver Federal Center
Denver, Colorado 80225

Telephone: FTS 234-4180
Commercial: 303-234-4180

GPO 640 - 181

AQUATRAIN

OFFICE OF SALINE WATER
TRANSPORT AND USE

U. S. Department of the Interior
Bureau of Reclamation
Code ERC-190
P O Box 25007
Denver, CO 80225

Telephone (303) 234-3828

A COOPERATIVE EFFORT . . . . . .
Government and Private Industry

August 1983

THE AQUATRAIN PROJECT

CONTENTS

Section		Page
1	Summary	1
2	The AQUATRAIN Process	5
3	The AQUATRAIN Project	9
	Objectives	9
	Transport Technology	9
	Configuration	11
	Corridor Selection	11
	Sources and Markets	13
	Project Description	13
	Financing Procedures	24
	Status and Schedule	26
4	Costs, Benefits, and Project Support	29

APPENDICES

1	Related Technologies	33
2	The Salinity Problem	39
3	The Coal Issue	43

FIGURES

1	Liquid Carbon Dioxide/Coal Slurry Pilot Plant	10
2	Potential Opportunities for Saline Water Use at Powerplants Along Proposed AQUATRAIN Route	16
3	Demonstration Test Loop	18
4	AQUATRAIN Project Schedule	27
5	Saline Water Cooling Tower	34
6	Fluidized-Bed Combustor	35
7	Dry Flue Gas Desulfurization	37
8	What Does Salinity in the Colorado River Mean?	42
9	Terminology	45
10	Fuel Comparison	45

MAPS

A	AQUATRAIN Pipeline System--Volumes and Capacities	12
B	Proposed Sources and Points of Use--Saline Water	14
C	Proposed Sources and Points of Use--Coal	15
D	Stage I	21
E	Stage II	23
F	Stage III	25

Section 1.

SUMMARY

The AQUATRAIN Project is a cooperative effort between government and private industry that would provide least-cost saline water control and economically competitive coal transportation.

The AQUATRAIN Project as currently conceptualized proposes an underground, multiple **pipeline system** carrying saline water, coal, and potentially other commodities, possibly from as far north as Wyoming to markets in the southwest U.S. or to a point on the Pacific Coast for export.

The AQUATRAIN pipeline system would carry water too salty for general use. This saline water, from natural and manmade sources along the pipeline corridor, contains large quantities of dissolved minerals (salts) and now flows into the Colorado River or its tributaries. Once in the river, these salts cause severe problems for downstream agricultural, municipal, and industrial water users.

With AQUATRAIN, the salt-laden water would be transported to the nearest points of beneficial use or disposed of in a cost-effective manner, thus limiting additional damage caused by saline water--currently estimated at $110 million per year. Without further **salinity control**, damages attributable to saline water are projected at nearly $270 million (constant 1982 dollars) annually by the year 2010. Neither of these estimates includes saline water damages to the environment and public health, nor damage in Mexico.

AQUATRAIN would help protect the quality of Colorado River water delivered to Mexico, as stipulated in Minute No. 242 to the U.S.-Mexico Water Treaty of 1944. AQUATRAIN will also help maintain water quality standards established by the Colorado River Basin States and the Environmental Protection Agency.

Western U.S. coal--which has a low sulfur content and high British Thermal Unit (BTU)* rating--is an available fuel for electric utility powerplants. However, escalating **rail freight rates** are slowing the growth and development of western U.S. coal. These freight rates often result in a **100-percent increase** between coal costs at the mine mouth and coal delivered to the customer. It appears that AQUATRAIN would be able to transport coal at lower rates from the start, and the effects of inflation would escalate the transportation costs at a rate less than that of rail delivery systems.

*A British Thermal Unit is a standard measure of a fuel's heat value. One BTU is the heat required to raise one pound of water one degree Fahrenheit.

To meet the project's critical objective of competitive product transport in the pipeline system, liquid carbon dioxide (CO_2) is proposed as a transport medium. The naturally occurring chemical compound has a greater carrying capacity than water in a conventional slurry pipeline, allowing more sources and markets to be served. The liquid CO_2 will also protect the quality of the coal (or the product made from the coal) during transport. The potential liquid CO_2 transport of other commodities such as soda ash, grain, and clay products is proposed to make optimal use of the system, but laboratory and pilot plant testing will be needed.

Through a Cooperative Agreement, the U.S. Department of the Interior's Bureau of Reclamation and Aquatrain, Inc. (a company representing private industry) are jointly investigating the project's concept.

The foremost purpose for government participation in AQUATRAIN is to develop an alternative for reducing salinity in the Colorado River at the lowest cost and, where possible, for **beneficially using the water.**

The foremost interest of Aquatrain, Inc., is to attain **an economically competitive, long-term method of transporting coal** from coal-rich regions of Wyoming, Colorado, and Utah to domestic markets in the southwest U.S. and possibly export markets.

Additional benefits could result from achieving these objectives. AQUATRAIN would minimize the cost of energy produced from new coal-fired electric utility powerplants by making low-cost, high-quality coal and/or coal products readily available and by beneficially using saline water rather than freshwater to cool powerplants. AQUATRAIN would also help **reduce the amount of oil and gas** currently being burned in powerplants, conserving it for other, more beneficial uses. For example, the AQUATRAIN Project, at 30 million tons of coal annually, could replace the equivalent of about 120 million barrels of petroleum-based fuels now being burned to produce 60 billion kilowatt-hours of electricity. Freeing up that petroleum resource through use of coal in coal-fired powerplants would be cheaper than building new synthetic oil plants, resulting in further savings to utilities, consumers, and the Nation.

A portion of the savings in commodity transport revenues would be used to support AQUATRAIN's transportation of saline water. **Private industry would bear project construction costs** and, if necessary for project financial integrity, the Federal government's salinity control program would pay a negotiated share of operation and maintenance costs. The cost of the entire pipeline system is estimated at $2-3 billion (constant 1982 dollars).

The project is now in the plan formulation stage and expressions of interest are being sought from suppliers and users to broaden industry participation in the project. Studies to be done in the preconstruction planning stage, scheduled for late 1983 to mid-1985, will be used to determine the feasibility of the system.

The intent of AQUATRAIN is to meet the objectives of government and private industry by:

* Saving U.S. taxpayers hundreds of millions of dollars in salinity control monies
* Converting a polluting substance into a resource
* Stimulating the western U.S. coal industry
* Helping stablize electric rates by providing competition in coal transport
* Contributing to reduction of America's dependence on imported energy
* Providing jobs, not only during construction, but throughout its 100-year projected lifespan
* Helping maintain international relations by protecting the integrity of agreements with Mexico
* Enhancing the balance of trade by making U.S. coal competitive in international markets

Section 2.

THE AQUATRAIN PROCESS

Responsibilities and Key Entities

The process being used to make AQUATRAIN a reality is as unique as the project itself. An unusual combination of entities have cumulative responsibility. Private industry and various segments of Federal, State, and local governments are combining talents and resources in AQUATRAIN planning.

A **Cooperative Agreement** dated November 11, 1983, signed between the Bureau of Reclamation and Aquatrain, Inc., provides for **joint investigation** of the project. The study will be conducted within the framework of applicable Federal and State laws and regulations, as well as executive orders and administrative policies as they relate to water resources planning and development.

Aquatrain, Inc., has agreed to:

1. Develop procedures for financing the non-Federal share of the project.
   NOTE: It is envisioned that private industry will finance the construction and the majority of operation and maintenance of the AQUATRAIN Project. Dedication of a part of commodity transport savings, in essence, would support the project's salinity control objective.
2. Assume technology development responsibilities for the saline water and coal transport system.
3. Seek to broaden participation in the project by including coal users, transportation interests, and other coal producers.

The goal of private industry in attaching a salinity function to a coal transport project is to enhance possibilities of success through a collaborative process with government. A multipurpose pipeline which includes salinity control can yield to the private sector a higher expectation for the project's implementation.

The principal responsibility of the **Federal government** in this investigation is to represent and protect the public interest. The **Department of the Interior** through the Bureau of Reclamation's Upper Colorado Regional Director is responsible for: (1) overall project environmental analysis, (2) corridor selection, and (3) obtaining Federal permits. Through a Memorandum of Understanding signed April 4, 1983, the **Bureau of Land Management** (BLM) is providing support to Reclamation in the planning process. Specifically, BLM is assisting in preparation of environmental studies and rights-of-way identification. Other Federal agencies are providing technical support during project planning.

The seven **Colorado River Basin States**, (Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming) also have a role in AQUATRAIN. Acting through the Colorado River Basin

Salinity Control Forum, the States have agreed to (1) pursue needed legislation, and (2) address related State water rights issues. Members of the Forum are also taking a lead in identifying procedures and serve as a focal point for coordination with other affected sectors of State government.

A **multidisciplinary planning team** concept is being employed in this study. Subteams are composed of representatives from the Federal government, State governments, and private industry. The six subteams and responsibilities are:

Water Rights/Water Supply/State Issues

Identify water resources, users, and disposal opportunities.
Identify saline water rights.
Identify freshwater rights.
Estimate conceptual collection systems.
Identify exchange plan for saline water and freshwater.
Identify legislation.
Identify States' permitting processes.

Coal Market/Supply

Identify commodity sources and users.
Describe physical facilities for sources and users.
Identify other commodities (including their sources/users, physical facilities, etc.).
Secure letters of intent between sources and users.
Identify alternative transportation systems.
Determine merits and identify markets for beneficiated coal.
Summarize marketing studies.

Financial/Economic

Perform economic evaluations, identifying cost allocations, cost-effectiveness, benefits, needs for capital, tax ramifications, revenues, tariffs, etc.
Report costs/benefits to: Government sources, financial institutions, deferred compensation partners, and energy partners. Develop strategy, identify needs, and obtain investment capital commitments (includes risk capital and project financing).

Technical/Engineering

Define type and amount of service.
Describe transport mode comparisons.
Prepare designs and estimates for transport systems.
Determine feasibility of batched transport.
Determine research and development requirements.
Describe saline water use and disposal.
Define contract administration.
Summarize system testing evaluation.

Environmental/Corridor/Federal Permitting/Energy Management

Address Federal permitting requirements and rights-of-way acquisition.
Define available corridors and assess impacts.
Define environmental consequences of various transport modes.
Describe regional energy management opportunities, defining potential for oil and gas backout, power transmission system requirements, and effects on powerplant siting.
Perform disaster control impact analysis.
Select preferred route alternatives.
Define future studies and activities.

Planning Coordination/Reports/Public Involvement

Coordinate subteam efforts.
Conduct and coordinate overall public involvement activities.
Serve as public affairs liaison and produce public affairs materials.
Produce planning reports.
Establish and maintain PROPLAN, a computer-based management system.
Perform administrative functions.

Public Involvement

Planning for AQUATRAIN demands the involvement of a variety of informed, concerned citizens and groups to help mold it in the **best interests of all.**

Unlike many other projects which are essentially planned and designed before they are revealed to the public for comment, AQUATRAIN is being formed in full public view. Using this **"fishbowl" approach**, government and private industry representatives share with the public new ideas and possibilities as they evolve. In this stage, it is important to remember that many questions are yet unanswered, thus the need for further planning studies. The public provides a valuable service in this stage by identifying issues, needs, potential problems, and benefits associated with various possibilities. This feedback is then incorporated into the project plan for evaluation, resulting in an effort that hopefully will be **acceptable and beneficial to all.**

The AQUATRAIN concept is evolutionary and new possibilities continue to emerge. Every effort is being made--through correspondence, informational mailings, news reports, and public speeches--to keep concerned individuals and groups informed on the project's current status. In later stages of the project, formal public meetings will be held.

Section 3.

THE AQUATRAIN PROJECT

Objectives

The AQUATRAIN Project has two primary, but by no means exclusive, objectives:

1. To collect saline water in the Colorado River Basin, transport it to closest points of most beneficial use, and/or dispose of it in the least-cost manner.
2. To provide an economically competitive method of moving coal and other commodities from source points to markets using a part of the savings in commodity transport costs to pay for the salinity control function.

An anticipated result of these combined objectives is to minimize the costs of energy from new coal-fired electric utility powerplants by providing low-cost delivery of superior grade coal and/or coal products and making saline water available for powerplant cooling purposes. This will: (a) reduce the use of gas and imported oil for firing powerplants and conserve those resources for other more beneficial uses, and (b) reduce the use of freshwater for powerplant cooling.

Transport Technology

New opportunities for pipeline use and technology development are rapidly emerging as AQUATRAIN progresses. The most promising operating system under consideration for AQUATRAIN is a **liquid carbon dioxide (CO_2)/coal slurry** technique. Arthur D. Little Inc., and W. R. Grace & Co., have been working for several years on development and commercialization of a patented liquid CO_2/coal slurry transportation technology. A pilot plant complete with 2- and 3-inch-diameter pipeline loops (Figure 1) is operating and data collected are being evaluated.

Complementing research on liquid CO_2 is the recent experience of coal-fired powerplants in storage, use, and handling of pulverized coal. Most powerplants currently receive and store lump coal. While finely ground coal is not a commodity typically delivered to powerplants, it has been successfully stored and used. AQUATRAIN would employ the technology of liquid CO_2 transport of pulverized coal to serve powerplants along the corridor route, and confirmation of fine coal handling techniques is planned.

A significant advancement in the liquid CO_2 transport technology has been realized recently. Pilot plant tests now indicate that a slurry mixture of 85 percent coal/15 percent liquid CO_2 can be transported long distances. The increased ratio of coal to liquid CO_2 will make the pipeline even more cost-effective and will allow more sources and markets to be served along the corridor route. Use of the 85/15 ratio also will reduce the amount of CO_2 required.

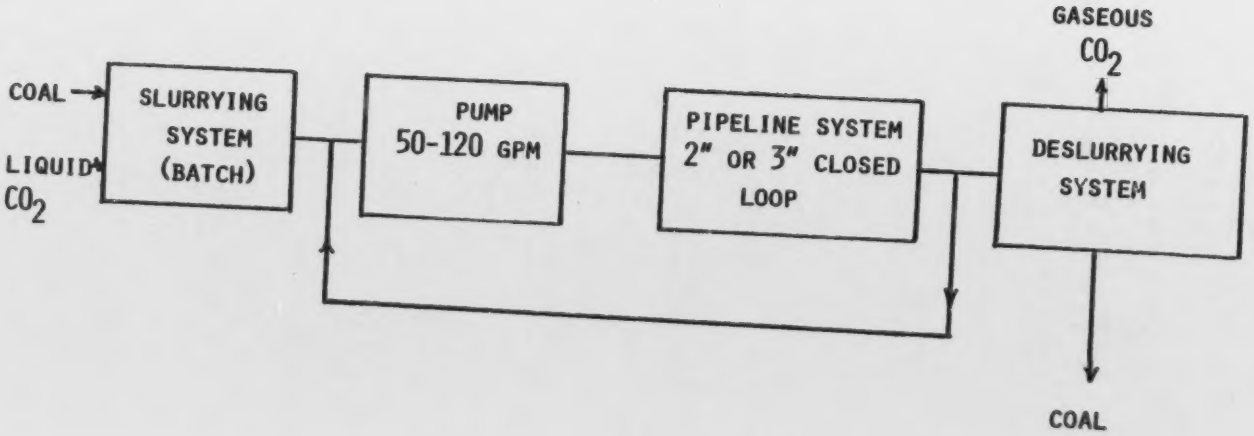


FIGURE 1
LIQUID CARBON DIOXIDE/COAL SLURRY PILOT PLANT

SOURCE: ARTHUR D. LITTLE

AQUATRAIN's use of the liquid CO_2 transport technology offers advantages over traditional water-based slurries in addition to the ability to carry much more pulverized coal:

* Water from sources in the Upper Colorado River Basin can be kept within the Upper Basin, eliminating water export which is governed by many laws and compacts.
* Cross-contamination problems associated with coal/water slurries can be avoided.
* A major financial and technological drawback of conventional water slurries--separating coal from the slurry medium--is minimized with CO_2.
* The ultimate water disposal problem is eliminated by a CO_2 slurry.
* Power can be saved by pumping the water only as far as points of use or disposal, rather than to the end of the pipeline if water were used to slurry coal.

It is envisioned that other commodities could also be transported in CO_2 to make optimal use of the system, but further laboratory and pilot plant testing would be needed. Conceptually, no major technical obstacles are anticipated. Proposed commodities include soda ash, grain, and clay products. Transport technology studies on these commodities will progress as expressions of interest are received.

All feasible slurry technologies are being considered for AQUATRAIN. To date, however, liquid CO_2 appears to be the most promising medium to meet the critical project objective of competitive product transportation in a pipeline system.

Configuration

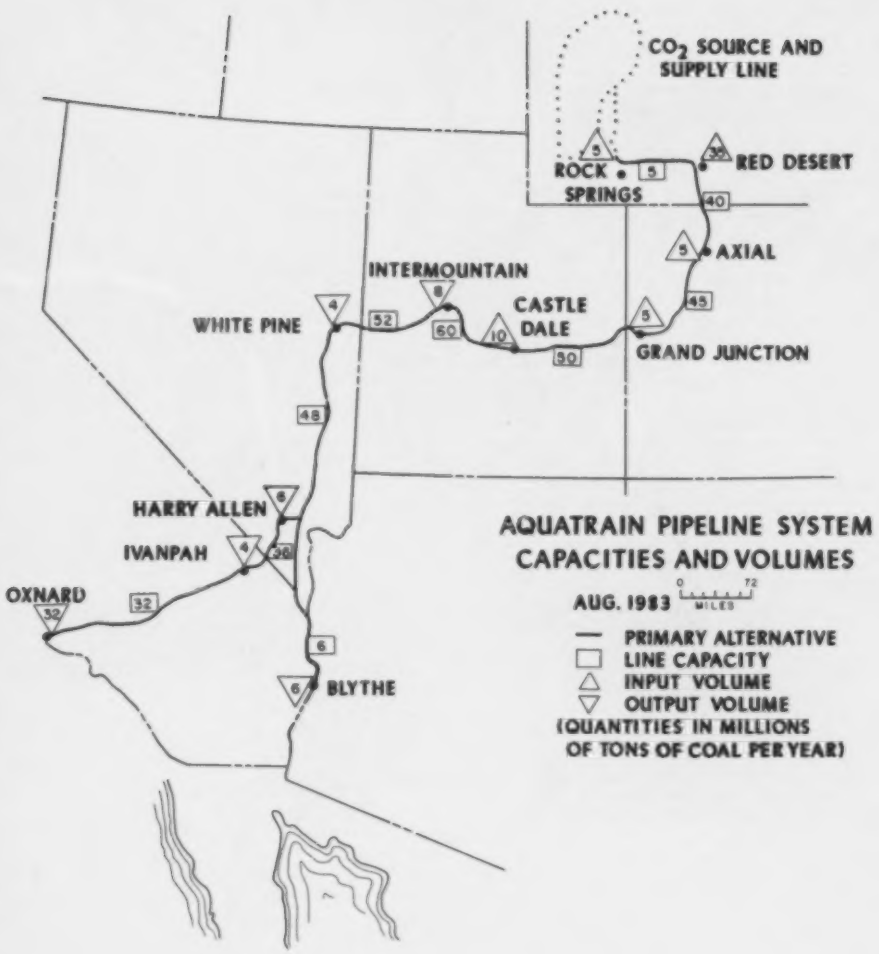
The AQUATRAIN system could use multiple pipelines installed in the same corridor over portions of the route. This would allow coal and saline water to be carried in separate pipelines, minimizing product storage costs at each end of the system and maximizing system reliability. A third pipe could be installed for returning a part of the CO_2 back to the system's loading points. Availability of liquid CO_2 in the return pipeline would allow numerous loading points, facilitating participation of small coal producers along the pipeline corridor. The actual configuration and sizing of pipes will be based on many factors including: throughput*, location, environment, cost, and reliability. Map A illustrates anticipated line capacities, input volumes, and output volumes.

Corridor Selection

Various pipeline corridors have been identified by the Bureau of Reclamation with the assistance of the Bureau of Land Management. That identification process entailed a comparison of saline water sources, previously evaluated pipeline routes, and expressions

*Throughput is the volume of commodities carried in the pipeline.

MAP A


CO_2 SOURCE AND SUPPLY LINE
ROCK SPRINGS
RED DESERT
AXIAL
INTERMOUNTAIN
CASTLE DALE
WHITE PINE
GRAND JUNCTION
HARRY ALLEN
IVANPAH
OXNARD
BLYTHE
AQUATRAIN PIPELINE SYSTEM
CAPACITIES AND VOLUMES
AUG. 1983
0
72
MILES
PRIMARY ALTERNATIVE
LINE CAPACITY
INPUT VOLUME
OUTPUT VOLUME
(QUANTITIES IN MILLIONS OF TONS OF COAL PER YEAR)

of interest received by Aquatrain, Inc., from potential participants. The proposed route follow, for the most part, existing corridors (e.g., highways and existing pipelines), thus reducing certain environmental impacts. **Industry and public comments** are now being sought to evaluate preliminary alternatives. Detailed environmental analyses along the proposed corridor routes will be done in the preconstruction planning stage, and corridor selection will be made after National Environmental Policy Act requirements have been satisfied.

Sources and Markets

Conceptually, the pipeline would originate in Wyoming where saline water, coal deposits, CO_2, and other commodities are readily available. Major deposits of trona, an ore from which soda ash is made, are also available for mining, processing, and export by AQUATRAIN from southwestern Wyoming. As the pipeline travels through Colorado and Utah, it would collect more saline water and coal as shown in Maps B and C. Powerplants and industries along the way could take coal and saline water from the pipeline system for various uses. Along the corridor routes, there are potential powerplant uses for nearly 200,000 acre-feet of saline water (Figure 2) as well as domestic markets for 30 million tons of coal per year. At a port facility on the Pacific Coast, coal could be exported to foreign markets. When the CO_2 and coal have been separated, the CO_2 could be marketed for use in enhanced oil recovery, welding, beverages, refrigeration, and chemicals--or be returned for reuse in the pipeline.

Project Description

As now envisioned, implementation of the AQUATRAIN Project will begin with a 14-mile demonstration unit followed by three distinct stages of pipeline system construction. Each stage would be initiated based on investments and market demands, and subsequent stages may be added as needed.

Demonstration Unit. - The demonstration unit will include a test loop and a cooling tower using saline water.

Work is expected to begin on construction of a 14-mile demonstration test loop in 1984, with completion in 1985. The underground pipeline loop (Figure 3) will be located at a powerplant in the western United States and will be designed to transport coal at a rate of 5 million tons per year in a liquid CO_2 slurry. Preliminary discussions have been held with Utah Power and Light Company regarding locating the test loop at their Hunter Powerplant near Castle Dale, Utah.

The demonstration loop, using commercial-size equipment, is needed to fully verify (1) the liquid CO_2/coal slurry technology

MAP B

AQUATRAIN PIPELINE SYSTEM PROPOSED SOURCES AND POINTS OF USE -- SALINE WATER

MAP C

AQUATRAIN PIPELINE SYSTEM PROPOSED SOURCES AND MARKETS -- COAL

FIGURE 2

POTENTIAL OPPORTUNITIES FOR USING SALINE WATER AT POWERPLANTS ALONG PROPOSED AQUATRAIN ROUTE

Name	Lead Utility/Owner	MW Capacity	Current Status	Amount of Cooling Water	Current Source of Cooling Water	Proposed Saline Source of Cooling Water	Salt Load Removed Tons/Year
Jim Bridger	Pacific Power & Light	4 ea - 500 MW Units	All units on line	20,000 AF/YR	Green River	Big Sandy River Unit	116,000[1]
Hunter	Utah Power & Light	2 ea - 400 MW Units operating. 3rd 400 MW Unit under construction.	3rd Unit to be completed summer 83. 4th Unit (400 MW) is planned but deferred.	18,000 AF/YR for Units 1, 2, 3, & 4	Cottonwood Creek	Price-San Rafael Rivers Unit	
Huntington	Utah Power & Light	2 ea - 400 MW Units	All units on line	10,000 AF/YR	Huntington Creek	Price San Rafael Rivers Unit	145,000[2]
Intermountain Power Project	Los Angeles Dept of Water & Power	2 ea - 750 MW Units 2 additional 750 MW units planned.	Units 1 & 2 under construction Unit #1 scheduled on line 7/86 Unit #2 scheduled on line 7/87 3rd & 4th 750 MW Units planned but deferred.	36,000 AF/YR for Units 1, 2, 3, & 4	Groundwater & Sevier River	Water delivered via Aquatrain from Price-San Rafael River, Dirty Devil River and Glenwood-Dotsero Springs	281,000 Glenwood-Dotsero 38,000 Dirty Devil 319,000[3]
White Pine	Los Angeles Dept of Water & Power	2 ea - 750 MW Units	Proposed Plant Unit #1 scheduled on line mid-1989 Unit #2 scheduled on line mid-1990	22,000 AF/YR	Groundwater	None	
Harry Allen	Nevada Power	4 ea - 500 MW Units	Proposed Plant Unit #1 scheduled on line 1994 Unit #2 scheduled on line 1995 Unit #3 scheduled on line 1996 Unit #4 scheduled on line 1997	32,000 AF/YR	Las Vegas Municipal Wastewater	Lower Virgin River	
Mohave	Southern California Edison	2 ea - 790 MW Units	All units on line	21,000 AF/YR	Colorado River	Lower Virgin River	202,000

POTENTIAL OPPORTUNITIES FOR USING SALINE WATER AT POWERPLANTS ALONG PROPOSED AQUATRAIN ROUTE (Cont)

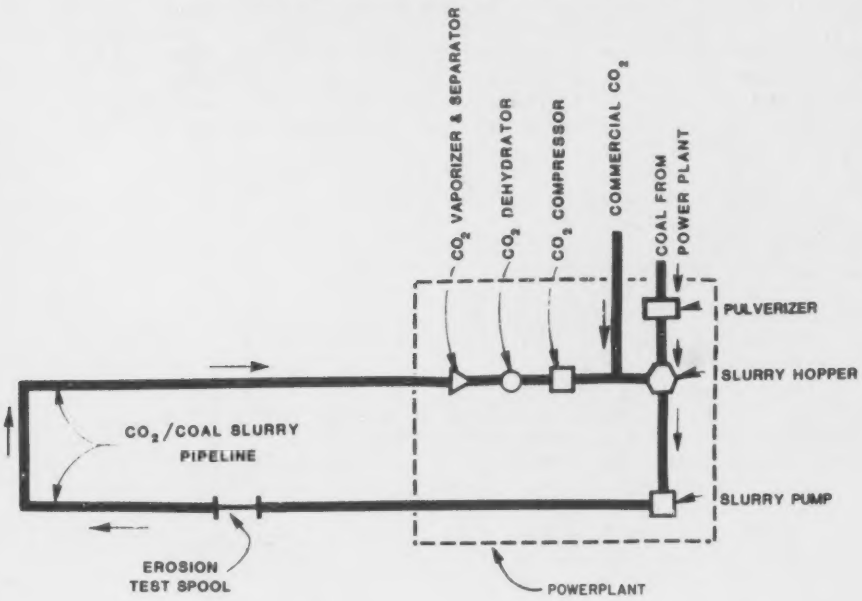
Name	Lead Utility/Owner	MW Capacity	Current Status	Amount of Cooling Water	Current Source of Cooling Water	Proposed Saline Source of Cooling Water	Salt Load Removed Tons/Year
Ivanpah	Southern California Edison	3 ea - 500 MW Units	Proposed Plant Units scheduled on line between 1991 and 1993	25,000 AF/YR	Colorado River (Lake Mohave)	Las Vegas Wash	68,000
Blythe	San Diego Gas & Electric	Has not been determined	San Diego Gas & Electric has acquired the site but has no definite plans as to when the plant will be built. Possibly mid-1990's.	33,000 AF/YR	Palo Verde Outfall Drain	Palo Verde Outfall Drain	76,000

1/ Total salt load to be removed from Big Sandy River is the total of 41,000 tons/year (7,000 AF) at Chevron phosphate plant, 30,000 tons/year (5,000 AF) at Texas Gulf Trona Processing Plant and 45,000 (7,550 AF) at Jim Bridger Powerplant.

2/ Firm yield from the Price-San Rafael Rivers for use at Hunter and Huntington Powerplants is 17,500 AF. The remaining 10,500 AF will be made up from non-firm Price-San Rafael River water or existing fresh water sources. Total salt load removed of 145,000 tons/year is based on 28,000 AF.

3/ Salt load removed at IPP is based on firm yield of 15,500 AF of Glenwood-Dotsero Springs water and 2,700 AF of Dirty Devil River water. The remaining required cooling water of 17,800 AF (36,000 - 18,200) will come from existing fresh water sources, non-firm Price San Rafael River water or other Colorado River saline water sources.

FIGURE 3
DEMONSTRATION TEST LOOP
LIQUID CARBON DIOXIDE/COAL SLURRY SYSTEM



at a larger scale than presently possible in the pilot plant stage, and (2) batching (alternate injection and transport) of the liquid CO_2/coal slurry and saline water. Techniques for storage, use, and handling of fine coal in a powerplant environment are anticipated to be confirmed. In addition, the loop is expected to provide data on the following: operating factors and conditions for the commercial-size system; improved capital, operating, and maintenance costs; and verification, improvement, and/or limitations of equipment design. The following variables will be observed or controlled during the 9-month testing period.

* Changes in velocity
* Liquid CO_2/coal ratio
* Viscosity
* Specific gravity (i.e., bulk density)
* Erosion
* Corrosion
* Pressure drop
* Simulated pipe breakage
* Temperature
* Coal particle size distribution on pumping characteristics
* Coal particle size change during trip
* Transportation characteristics of coal particle sizes up to 1 by 0 inch in dense media CO_2
* Angle of repose of pumped coal
* Solubility of coal in liquid CO_2 and vice versa
* Effect of high pressure
* Injection of saline water

Saline water cooling towers are relatively new and operating experience is limited. However, initial field testing by other groups has yielded promising results. The concept of these towers is discussed in more detail in Appendix 1, Related Technologies. Before saline water cooling towers can be deemed acceptable, a demonstration to verify reliability for potential application is essential.

Reclamation, in cooperation with the Colorado River Basin Salinity Control Forum, is pursuing a **technology verification program** and will obtain consulting services to assist in design and installation of a small saline water cooling tower. A cost-sharing arrangement among utilities, the tower manufacturer, and Reclamation is expected to provide for a 2-5 year verification program. Preliminary discussions have been held with Utah Power and Light Company regarding siting the saline water cooling towers at their Hunter Powerplant near Castle Dale, Utah.

Results of the verification program will also be used to confirm the economics of using saline water from the Price-San Rafael River Basin in Utah, Glenwood-Dotsero Springs in Colorado, and other saline water sources in the Colorado River Basin for powerplant cooling.

It is anticipated that data gathered from operation of the demonstration liquid CO_2/coal slurry test loop and saline water cooling tower will permit AQUATRAIN to progress to Stage I. Plans for subsequent stages after demonstration are dependent upon findings obtained during testing, and details are subject to change as the project progresses.

Stage I. - The AQUATRAIN Project proposes to design and construct a liquid CO_2/coal slurry and saline water pipeline to transport 5 million tons of coal and 17,500 acre-feet of saline water per year. This system will be composed of a series of separate lines for the coal slurry and saline water. The liquid CO_2/coal slurry line will be built to handle future growth to a full capacity of 30 million tons of coal per year. Design and construction of this first commercially operational stage of the system is scheduled to begin in 1984, with anticipated completion in 1988. Map D illustrates the route of this stage.

The liquid CO_2/coal slurry pipeline would transport coal from Emery and Carbon Counties, Utah (near Price) to the Intermountain Power Project (IPP) near Lynndyl, Utah. Potential sources include six underground mines and four CO_2 sources. The coal would be delivered by truck from mines to a pipeline loading station near Hiawatha Junction, Utah and then crushed to suitable size for transport in CO_2. At IPP, the coal and CO_2 would be separated, making the coal ready for use in the powerplant.

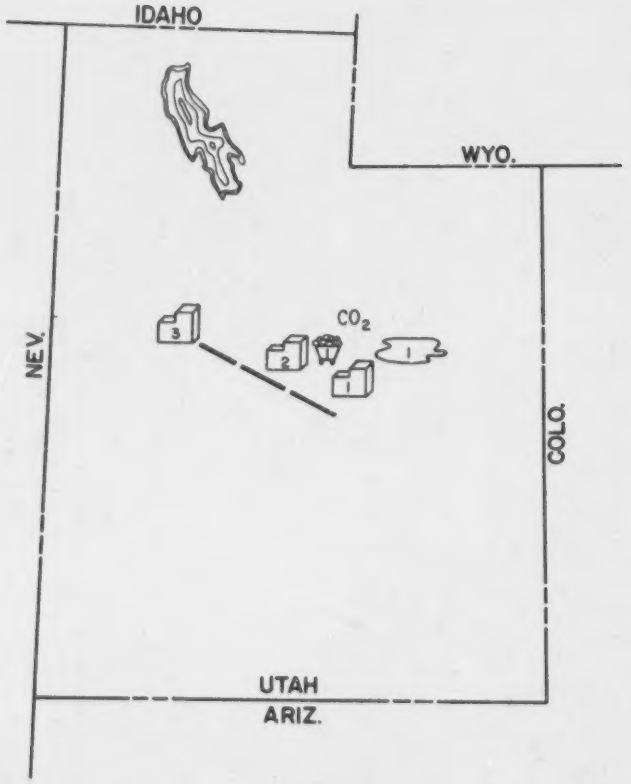
It is conceptualized that saline water from the Price-San Rafael Unit of the Colorado River Water Quality Improvement Program (CRWQIP)* would be carried by pipeline to UP&L's Hunter Powerplant for use in cooling. A 102-foot-high earthfill dam would be built on Desert Seep Wash, creating a 24,000-acre-foot reservoir. In addition, a 58-foot-high earthfill dam would be built at Rock Canyon Creek, forming a 7,000-acre-foot reservoir. Other small drains in the area could serve as water sources if needed. Approximately 18,000 acre-feet of saline water with an average salinity level of about 3,800 mg/L would be carried annually from the reservoirs by pipeline to the powerplant. Use of this water will remove approximately 90,000 tons of salt from the Colorado River system, amounting to a reduction of 9 mg/L TDS (total dissolved solids) at Imperial Dam. (Appendix 2 provides more information on the salinity problem and related terminology.)

*CRWQIP is the Bureau of Reclamation's overall effort to reduce salt loading in the Colorado River by controlling agricultural, point, and diffuse salinity sources.

AQUATRAIN PROJECT
STAGE I
(8-83)

- PRIMARY ALTERNATIVE
- 1 HUNTER POWERPLANT
- 2 HUNTINGTON POWERPLANT
- 3 INTERMOUNTAIN POWERPLANT SITE
- 1 PRICE/SAN RAFAEL SALINITY UNIT
- CASTLE DALE (EMERY COAL FIELD)
- CO_2 CARBON DIOXIDE SOURCE(S)

MAP D



At Hunter, the presoftened saline water would be used in existing wet cooling towers, and discharge would then be circulated through the saline water cooling tower. Blowdown* from the tower would be about 550 acre-feet per year of 120,000 mg/L saline water which would be disposed locally or carried by the liquid CO_2/coal slurry pipeline to Sevier Dry Lake for solar evaporation. The alternative selected will depend on economics and technical issues dealing with the feasibility of transporting saline water in the CO_2/coal slurry line.

Huntington Powerplant, near Price, is also being considered as a potential site for saline water use and details are being formulated.

Stage II. - Stage II would be designed to increase the coal-carrying capacity of Stage I from 10 million tons to an ultimate capacity of 30 million tons annually. The amount of saline water transported would be increased from approximately 18,000 to 36,000 acre-feet. Map E illustrates this stage, which would be designed and constructed from 1986-88.

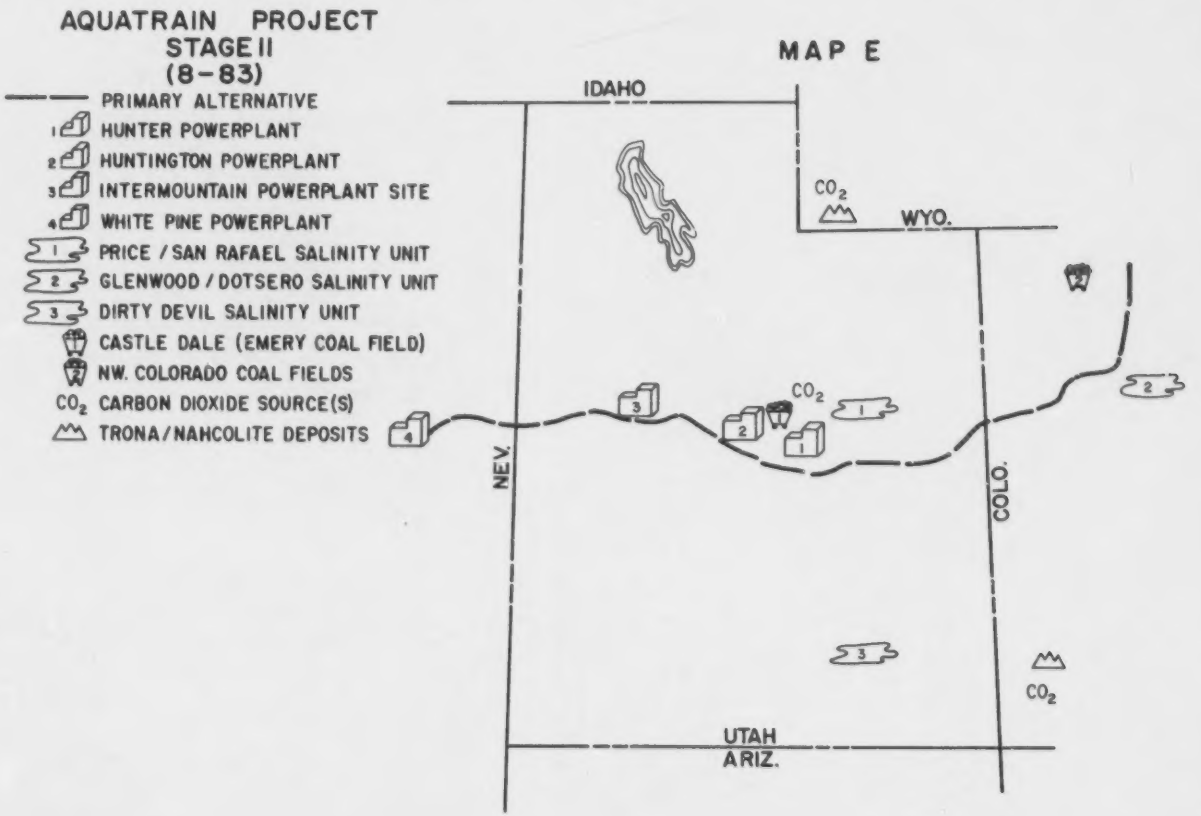
The Stage I liquid CO_2/coal slurry line would be integrated with the Stage II slurry line running from western Colorado, through Utah, to the proposed White Pine Power Project in east-central Nevada. This would allow for transport of Utah coal to IPP in Utah, and of Colorado and/or Utah coal to White Pine.

In Stage II, coal from eastern Utah and/or western Colorado could be transported by railroad or truck from local mines to central preparation plants (such as Axial, Colorado) for slurrying and injection into the pipeline.

In addition to water from the Price-San Rafael Rivers collected in Stage I, saline water would be collected from Glenwood-Dotsero Springs, Colorado, and Dirty Devil River, Utah, and carried to IPP for use in a saline water cooling tower to be installed. Approximately 15,500 acre-feet of Glenwood-Dotsero Springs water (average salinity level of 13,430 mg/L) and up to 2,715 acre-feet of Dirty Devil water (7,000 to 30,000 mg/L) would be used. Disposal would be in lined evaporation ponds or in Sevier Dry Lake. Use of water from Glenwood-Dotsero Springs would remove 281,000 tons of salt per year from the Colorado River, resulting in a reduction of 28 mg/L of TDS at Imperial Dam. Use of Dirty Devil River water will reduce the Colorado River's salt load by 38,000 tons per year, with a reduction of 3.8 mg/L of TDS at Imperial Dam.

The extended pipeline system would allow loading of nahcolite in southwestern Colorado. Nahcolite, a substance useful in reducing sulfur dioxide (SO_2) emissions in powerplant stack

*Blowdown is the water released from powerplant cooling towers when it becomes unusable due to high concentrations of salts through evaporation.


AQUATRAIN PROJECT
STAGE II
(8-83)
PRIMARY ALTERNATIVE
1 HUNTER POWERPLANT
2 HUNTINGTON POWERPLANT
3 INTERMOUNTAIN POWERPLANT SITE
4 WHITE PINE POWERPLANT
1 PRICE / SAN RAFAEL SALINITY UNIT
2 GLENWOOD / DOTSERO SALINITY UNIT
3 DIRTY DEVIL SALINITY UNIT
CASTLE DALE (EMERY COAL FIELD)
NW. COLORADO COAL FIELDS
CO_2 CARBON DIOXIDE SOURCE(S)
TRONA/NAHCOLITE DEPOSITS
MAP E
IDAHO
WYO.
NEV.
COLO.
UTAH
ARIZ.
CO_2

gases, could be carried in a liqiud CO_2 slurry to powerplants along the pipeline route. CO_2 for Stage II could be obtained from powerplant stack gases and/or natural sources in Colorado and Wyoming.

Planning may be broadened to extend the northern leg of the Stage II pipeline into Wyoming to pick up additional coal, CO_2, and soda ash (trona). Trona can also be used to reduce SO_2 emissions in powerplant stack gases.

Stage III. - Stage III would include a northerly extension of the liquid CO_2/coal slurry line into Wyoming and a southerly extension from the White Pine Power Project to California, and possibly to export markets. Stage III could incorporate either of these extensions or both as options. Saline water (7,550 acre-feet per year) from the CRWQIP's Big Sandy Unit, Wyoming, could be transported to Jim Bridger Powerplant for cooling. In addition, saline water from the Virgin River and Las Vegas Wash, Nevada, could cool Harry Allen and/or Ivanpah Powerplants, while irrigation outflows from the Palo Verde Irrigation District could be used at the proposed power park near Blythe, California. No water would be exported from the Upper to the Lower Colorado River Basin. CO_2 could be carried to California for use in enhanced oil recovery when Stage III is completed. Map F illustrates this stage, anticipated for design and construction start in 1986.

Financing Procedures

It is visualized that financing for the AQUATRAIN Project could be arranged through both a **venture capital partnership and normal bonding procedures.** Potential members of the partnership include coal companies, utilities, transportation companies, and individuals or institutions involved in funding new ventures. The venture capital partnership would fund the test loop as well as the preconstruction activities in Stage I, amounting to about $40-50 million

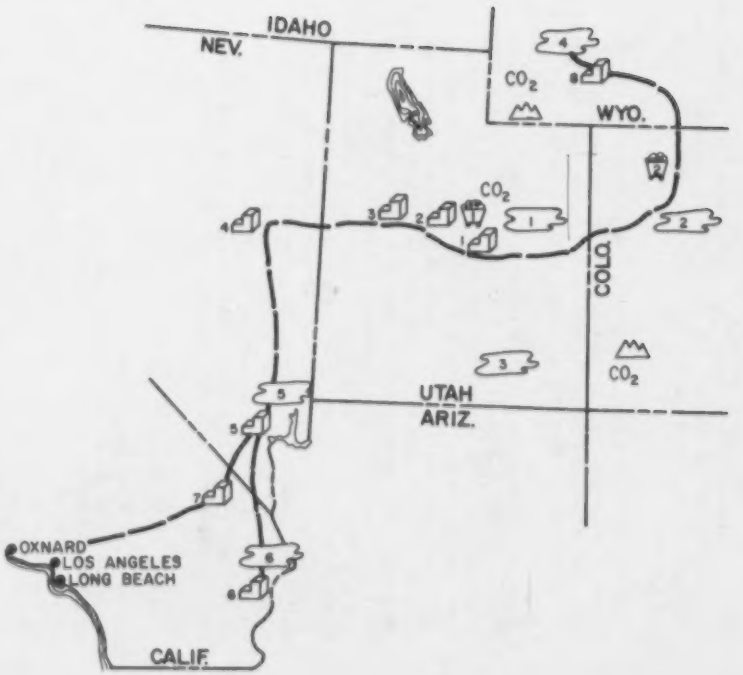
Security for financing Stage I facilities will be in the form of "take if delivered" contracts with the Intermountain Power Association, those prices to be at or below the cost of coal delivered through alternative means. Facility ownership will remain in the private sector to allow firms to use investment tax credits available through existing pipeline tax law. If necessary for financial integrity, the Bureau of Reclamation will assume a share of the cost of operating and maintaining the system in the form of a contract providing for "annual payments for salinity control". With security in the forms of the above-described "take if delivered" and "annual payments for salinity control" contracts, the bulk of the financing for Stage I construction will be leveraged into the bond markets.

Financing for construction of additional stages would be handled in the same manner as Stage I.

AQUATRAIN PROJECT
STAGE III
(8-83)

- PRIMARY ALTERNATIVE
- 1 HUNTER POWERPLANT
- 2 HUNTINGTON POWERPLANT
- 3 INTERMOUNTAIN POWERPLANT SITE
- 4 WHITE PINE POWERPLANT
- 5 HARRY ALLEN POWERPLANT
- 6 BLYTHE POWERPLANT SITE
- 7 IVANPAH POWERPLANT
- 8 JIM BRIDGER POWERPLANT
- 1 PRICE/SAN RAFAEL SALINITY UNIT
- 2 GLENWOOD/DOTSERO SALINITY UNIT
- 3 DIRTY DEVIL SALINITY UNIT
- 4 BIG SANDY SALINITY UNIT
- 5 VIRGIN RIVER/LAS VEGAS WASH
- 6 PALO VERDE IRRIGATION DISTRICT
- CASTLE DALE (EMERY COAL FIELD)
- NW. COLORADO COAL FIELDS
- CO_2 CARBON DIOXIDE SOURCE(S)
- TRONA/NAHCOLITE DEPOSITS

MAP F



Status and Schedule

AQUATRAIN has recently moved from the conceptual stage to the **plan formulation stage.** Informal discussions have been held with the potential coal and saline water users and they have expressed support for the project concepts. Present activities include data collection and preliminary evaluation to determine environmental, engineering, and economic aspects of the project. Based upon those analyses, the potential coal and saline water users will be asked to enter participation agreements. **Expressions of interest** are being sought from commodity suppliers and users (particularly coal) to broaden participation in the project. The plan formulation stage will come to a close with the preparation of a decision document describing the configured project based upon conditional industry participation agreements. This document is scheduled for completion in 1983.

The next stage, **preconstruction planning,** is scheduled to begin in fall 1983 and continue until mid-1985. Design data and cost estimates will be developed in this phase and site-specific technical and environmental data will be collected. At the conclusion of preconstruction planning, a final joint planning report and final environmental impact statement will be completed for use in determining the project's feasibility.

Figure 4 shows the overall project schedule.

The liquid CO_2/coal slurry line construction schedule is dependent upon the test loop verification program. There is a possibility that other parties will build a commercial size short-haul liquid CO_2/coal slurry line in the near future, thus eliminating the need for the test loop. If this happens, some savings in time may be achieved, and the construction schedules for Stages I and II may be accelerated.

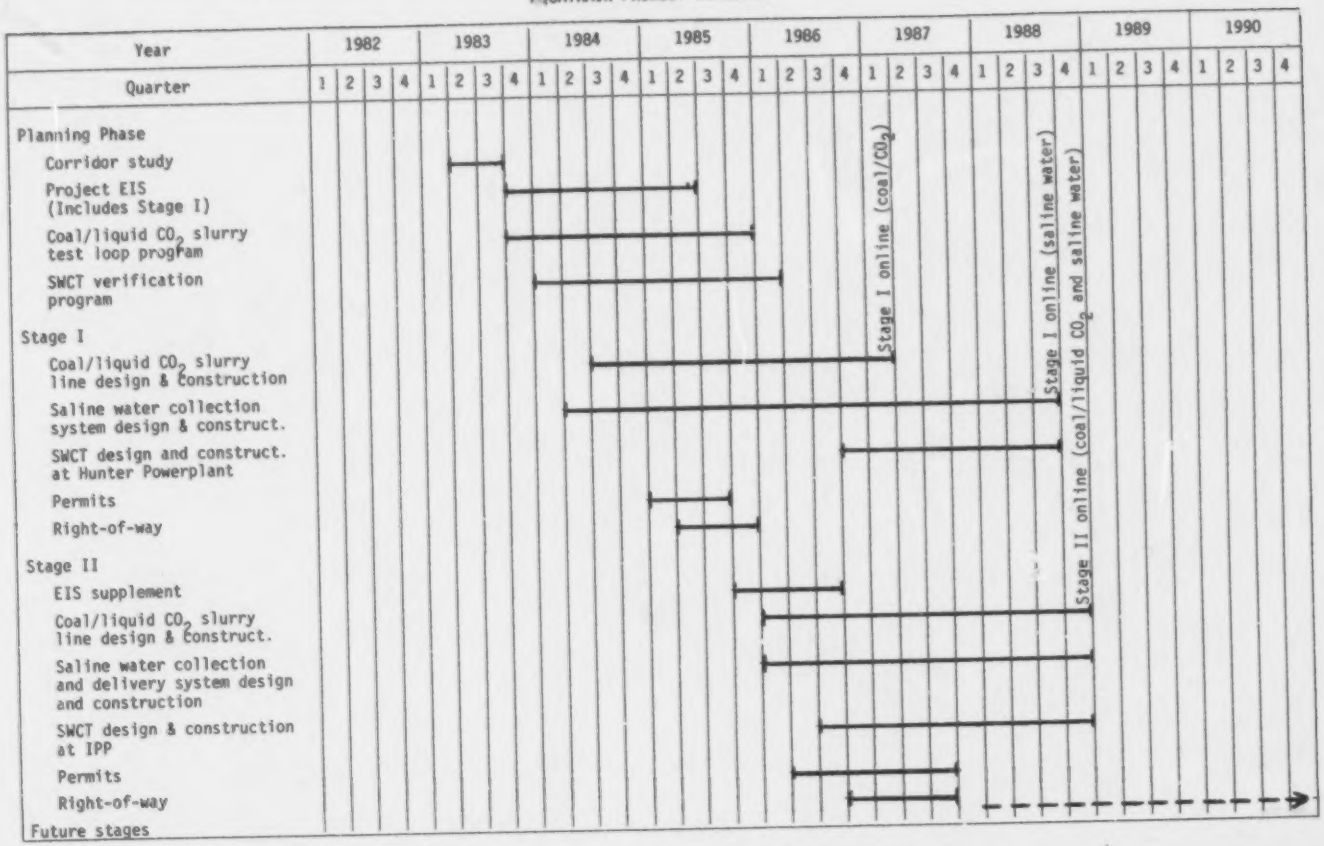
Stage I construction of the liquid CO_2/coal slurry line is not dependent on the saline water construction program; therefore, if delays are experienced in the saline water verification program, they will not affect the liquid CO_2/coal line or vice versa.

Federal legislation which contains measures in support of saline water use applications has been introduced in the Senate (S.752) and House (H.R.2790). Specific measures related to AQUATRAIN include authorization of projects to demonstrate saline water use technology and to beneficially use or dispose of saline water in joint efforts with industry. Passage of this legislation would allow the Bureau of Reclamation to participate in staged project construction, operation, and maintenance.

FIGURE 4

AQUATRAIN PROJECT SCHEDULE

7-5-83


Year
1982
1983
1984
1985
1986
1987
1988
1989
1990
Quarter
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4
Planning Phase
Corridor study
Project EIS (Includes Stage I)
Coal/liquid CO_2 slurry test loop program
SWCT verification program
Stage I
Coal/liquid CO_2 slurry line design & construction
Saline water collection system design & construct.
SWCT design and construct. at Hunter Powerplant
Permits
Right-of-way
Stage II
EIS supplement
Coal/liquid CO_2 slurry line design & construct.
Saline water collection and delivery system design and construction
SWCT design & construction at IPP
Permits
Right-of-way
Future stages
Stage I online (coal/CO_2)
Stage I online (saline water)
Stage II online (coal/liquid CO_2 and saline water)

Section 4.

COSTS, BENEFITS, AND PROJECT SUPPORT

Preliminary AQUATRAIN costs have been estimated, however, final cost estimates have not been made because opportunities and situations still exist to refine and optimize the project. Costs will be dependent upon a number of variables, such as total throughput, staged construction opportunities, corridor route and transport technology selected, costs for environmental compliance and permitting, and costs for capital equipment, operation, and maintenance. It is estimated that the entire AQUATRAIN pipeline system would cost $2-3 billion (1982 constant dollars).

Planning efforts will focus on the **most viable means of financing** among government and private interests. Savings in commodity transport revenues would be used to support AQUATRAIN's transportation of saline water. Private industry would bear project construction costs and, if necessary for project financial integrity, the Federal government's salinity control program would pay a negotiated share of operation and maintenance costs. The Basin States, through the Colorado River Basin Salinity Control Forum, have introduced legislation which would extend existing cost-sharing provisions to projects such as AQUATRAIN. If approved, the State's 25-percent share of any Federal salinity control expenditure would be provided through revenues from public power sold in the Basin.

In assessing the potential costs and benefits of a multi-faceted effort such as AQUATRAIN, many interrelated factors must be considered. Outgrowths of the project may be perceived as pluses by some, and at the same time, as detriments by others. The relative costs and benefits must therefore be weighed and balanced to select the **most acceptable alternatives** and achieve the **greatest public good.**

During project planning, possible environmental, social, and economic impacts of the pipeline system will be addressed. Methods such as environmental assessments and impact statements, engineering studies, and public involvement activities will be employed to identify, avoid and/or minimize effects of pipeline construction and operation.

Environmental impacts resulting from AQUATRAIN would be similar to major pipeline systems previously engineered and analyzed. Direct effects would result from soil and vegetation disturbance and access created to previously undisturbed areas. Wildlife might be affected and possible conflicts with existing land uses may arise. Risks to health and safety could also occur from pipeline ruptures. However, the underground pipeline system would provide esthetic benefits by reducing the number of future above-ground facilities needed for energy transportation, such as new railroad lines and long-distance, high-voltage powerlines.

AQUATRAIN offers **positive benefits to society** by helping to preserve water quality for 12 million people who depend on the Colorado River for municipal, industrial, agricultural, and recreational use. Without methods to control salinity sources, the river's quality would decline to unaccepable levels, creating undesirable environmental, social, and economic consequences and seriously impacting further development in the basin.

AQUATRAIN's collection of saline water from various sources will be accomplished within the mandates of **established water rights and compacts** in the Colorado River Basin. To prevent undesirable environmental impacts from streamflow depletion, some water replacement may be necessary. Water supply and water rights issues are being addressed as planning progresses.

By converting a damaging substance into a resource through saline water use in powerplants, AQUATRAIN can make thousands of acre-feet of freshwater available for other more beneficial uses. This is especially significant in the arid West where the population is growing rapidly and related demands for water are mounting. Use of saline water in powerplants is expected to create no adverse impacts, and the highly concentrated water discharged from powerplants will be disposed in lined solar evaporation ponds or dry lakes, resulting in minimal environmental effect. Economic benefits would accrue as powerplants replace costly freshwater with saline water.

Availability of **lower priced coal** for domestic use and possible export could create a demand for more mining, with related effects on the environment and the economy. Most of the coal to be mined is under current or potential Federal leases in Wyoming, Colorado, and Utah, and is both underground and surface mineable. Miners in those areas (now experiencing 25-30 percent unemployment) could return to work, creating **boosts for area economies**, while local air quality and physical environments would be affected.

The development of western coal reserves could be orderly and planned, rather than sporadic as experienced in recent years in response to periodic gluts and shortages of foreign energy supplies. Dependence on foreign sources could be reversed, while the United States energy base can be strengthened. Use of domestic coal supplies would help provide consumers with less expensive, more inflation-proof, and predictably priced energy. In addition, export of U.S. coal would further aid the economy by **enhancing the balance of trade**.

The potential downward push on the price of generating electricity, made possible by the AQUATRAIN Project through the availability of saline water in place of expensive or scarce freshwater and more economically priced coal, could positively affect decisions to build additional powerplants to **increase generating capacity** in the Southwest. This possibility also may cause

differing public reactions in relation to environmental and economic standpoints. Our population and resulting demands for energy continue to increase and more generating facilities--whether thermal, nuclear, or other--will be required or severe shortages will occur.

Another secondary impact of AQUATRAIN would be **improved air quality** in some areas. New coal-fired powerplants using fluidized-bed combustion technology could replace existing oil- and gas-fired facilities, eliminating SO_2 emissions and reducing nitrous oxide emissions. Coal-fired powerplants would produce **minimum emissions** by using the best control technologies available and possibly by using coal that has been cleaned to remove ash and sulfur pollutants. The new powerplants could be built in remote areas, resulting in benefits to metropolitan environments and societies where oil- and gas-fired powerplants are now in operation. Substituting high-grade coal for oil and gas in powerplants will result in conservation of those resources for other beneficial uses, lowering the need for future synfuel plants.

Another factor influencing costs and benefits is the potential of marketing CO_2 at the pipeline's terminus. CO_2 could be sold for use in industry or for enhanced oil recovery, rather than being recycled or vented to the atmosphere. Income derived from this sale would **decrease the system's total costs** and lead to more economical shipping rates for commodities.

Private industry financing of AQUATRAIN's salinity control function will **save a substantial portion of taxpayers' dollars** devoted to this purpose, making those funds available for other pressing needs. Use of the pipeline system to take saline water from just one source (Glenwood-Dotsero Springs, Colorado) of the 16 major saline sources could save about $280 million in single purpose Federal costs for collection facilities and evaporation ponds which would only waste the water. Desalting plants or evaporation ponds--the least costly salinity control alternatives after AQUATRAIN--could cost taxpayers between $4-8 billion (constant 1982 dollars) if used throughout the Colorado River Basin, and would have far more severe environmental impacts and greater energy requirements.

Coal royalties and severance taxes resulting from the project would add to State and Federal treasuries. Additional economic **benefits include jobs** that the project would create, including:

* Construction, operation, and maintenance of the pipeline system
* New and expanded coal and possibly trona mining and processing facilities
* Construction and operation of new powerplants
* Growth of port facilities
* New and expanded industries created by the availability of low-cost transportation of coal and other commodities, increased freshwater supplies, and stabilized electric rates to the consumer (through low-cost delivery of high-quality coal and/or coal products)

AQUATRAIN appears to offer a very cost-effective, timely means of controlling Colorado River salinity and transporting large volumes of coal--with added benefits not offered by other methods. As the project's potential uses and benefits are becoming known, interest in AQUATRAIN is growing steadily and support is becoming broad based.

The seven Basin States, through the Colorado River Basin Salinity Control Forum, are cooperating in the effort with the Bureau of Reclamation and Aquatrain, Inc. Forum representatives (appointed by their governors) have agreed to pursue legislation necessary for Reclamation's continued participation and to help address related State permitting and water rights issues.

Regional and local support is becoming evident through meetings and contacts with area representatives. On a national level, early discussions with environmental interests, producers of coal, soda ash, and grain; transportation companies; utility companies; and port facility developers have been positive.

Internationally, discussions are continuing with Pacific-rim countries such as Japan regarding their interest in AQUATRAIN-delivered coal, but no firm expression of interest has been obtained.

It is anticipated that use of the "fishbowl" planning approach and incorporation of the diverse needs and desires of governments, industry, and the public will lead to a viable project with widespread support.

Appendix 1.

RELATED TECHNOLOGIES

A number of technologies relating to saline water and coal use are currently being developed. The possibilities offered by these new techniques may enhance the AQUATRAIN Project further, leading to **additional benefits and cost savings.**

Increasing demand for freshwater has made use of saline water more desirable for industrial purposes, such as cooling. Also, regulations requiring zero discharge from powerplants have prompted development of economical methods to concentrate cooling water to a small percentage of its original volume. **Cooling towers,** using saline water delivered by the AQUATRAIN pipeline system, promise to meet both of these objectives. In a powerplant cooling tower, a primary cooling loop would contain freshwater while a secondary cooling loop would contain saline water (Figure 5). The loops would be separated by thin plastic sheets to prevent mixing. Heat from the freshwater would be transferred to the saline water, which would become more concentrated through evaporation. Resultant wastewater of 120,000 milligrams per liter salt concentration would be disposed in evaporation ponds or dry lakes.

Deep cleaning techniques for coal (also called washing or beneficiation) might be employed in the process of crushing coal for liquid CO_2 transport in the pipeline system to eliminate contaminants and produce a **high-grade coal product.** The results could be higher heat content of the coal, substantially lower costs for emission control equipment, and reduced shipping costs for domestic and export markets. Private industry and government-sponsored projects are developing methods to remove all or part of coal contaminants, such as moisture, ash, and sulfur. The coal product which would result from cleaning might be burned in existing powerplants now using expensive oil and gas, or could be burned in present or planned coal-fired powerplants as clean, efficient fuel.

Another possibility is the mixing of finely ground coal with either water or oil to produce a fue for oil- and gas-fired powerplants. These mixtures, which would have near homogeneous properties, could reduce boiler slagging and fouling and could subsequently **improve air quality.**

Coal that has not been cleaned could fuel powerplants without increasing pollution through **fluidized-bed combustion.** Several fluidized-bed designs are now available or under development for burning any grade of unwashed, crushed coal. In general, all fluidized-bed combustors generate steam from coal via a heat exchanger. In a fluidized-bed system (Figure 6), a mix of crushed coal and limestone (or dolomite) is constantly agitated from below by pressurized airjets. The mix responds in the manner of a boiling liquid, hence the term "fluidized". The ignited mix burns at 1500 to 1700° F -- **one-half the temperature**

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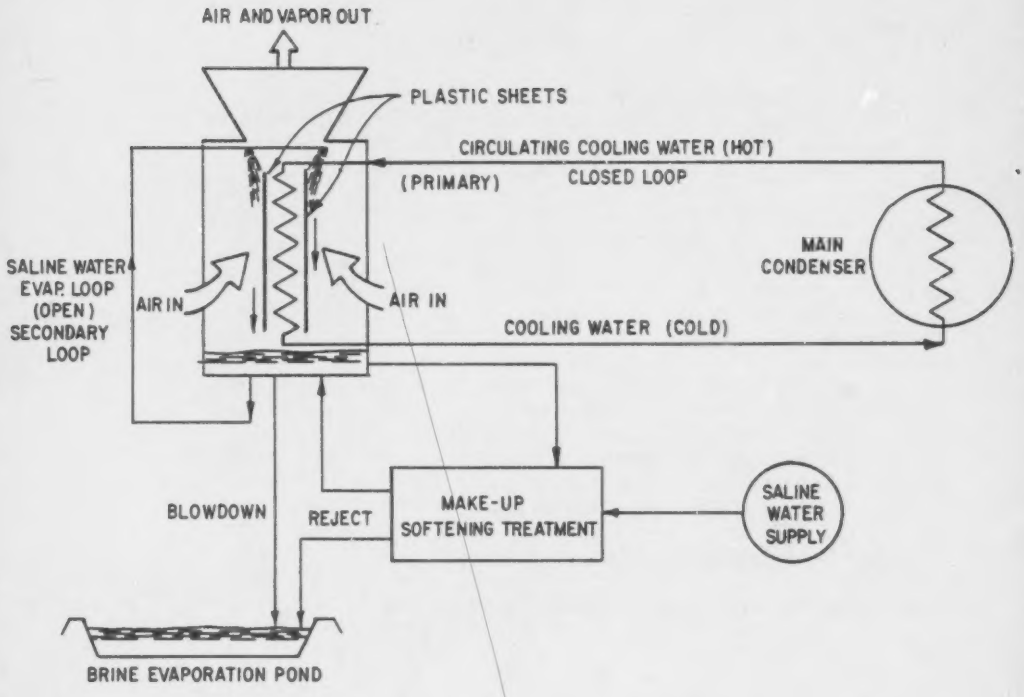

FIGURE 5
SALINE WATER COOLING TOWER

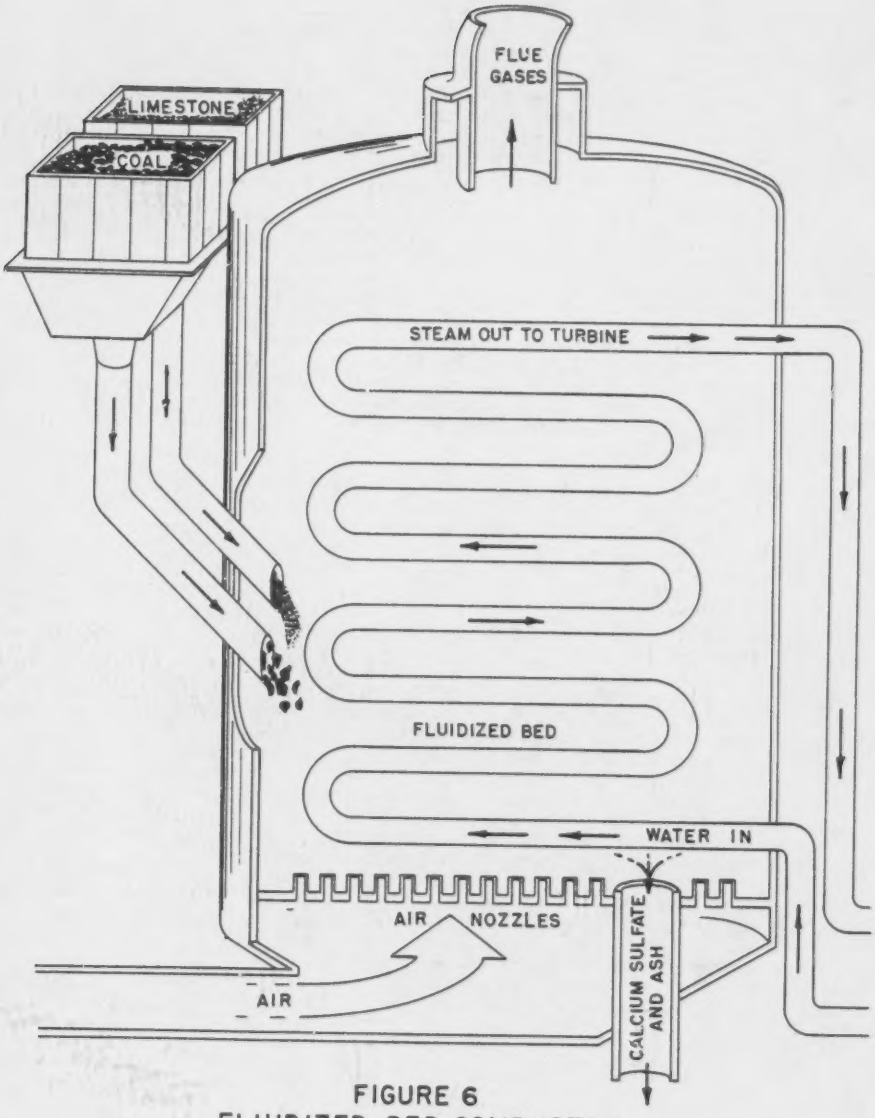

FIGURE 6
FLUIDIZED-BED COMBUSTOR
35

of conventional coal-fired steam generating systems. The bed's lower operating temperature and controlled combustion **substantially reduce generation of nitrous oxides.** The mix is in constant contact with the coiled metal tubes of the heat exchanger, and heat is transferred more efficiently than in present systems. The limestone or dolomite, in addition to transferring heat, absorbs sulfur and can **eliminate sulfur dioxide emissions.** The resulting sulfurous ash has been recycled successfully as a soil conditioner.

All coal contains sulfur which, when burned, produces sulfur dioxide (SO_2) in stack gases. These emissions can be detrimental to health, especially in cases of atmospheric inversions where polluted air is trapped near the ground. It is also thought that such emissions may contribute to production of acid rain. The Clean Air Act specifies SO_2 emissions must be reduced, and **dry flue gas desulfurization** is an emerging technology for achieving that goal (Figure 7). The technique would **remove** SO_2 by treating stack gases with natural minerals or compounds such as nahcolite, trona, or calcium carbonate (substances similar in consistency to baking powder). Two possible approaches have been identified:

1. The substance could be mixed with coal before burning. Then, when SO_2 is emitted, the nahcolite, trona, or calcium carbonate would catch and hold the SO_2.
2. When coal is burned and gases travel up the stack, a slurry of the substance could be sprayed into the gases to capture SO_2.

It may be possible in some cases to recover the sulfur for further marketing and use.

Another emerging technology involves use of coal refuse as a fuel for powerplants. The refuse, obtained after coal cleaning, might be burned using fluidized-bed combustion techniques to provide a **more economical energy source** while reducing accumulations of waste material. (About 25 percent of all mechanically cleaned coal is rejected and available as refuse.) Two factors are creating the incentive for use of coal refuse: (1) rising fuel demands and costs, and (2) the technology of fluidized-bed combustion which is not sensitive to the characteristics or quality of fuel being burned. As a byproduct of energy that could be produced from refuse, CO_2 in stack gases might be captured for use in the AQUATRAIN pipeline system.

Full development of these new technologies will be spurred by the ready availability of saline water and coal and/or coal products, economically transported by AQUATRAIN.

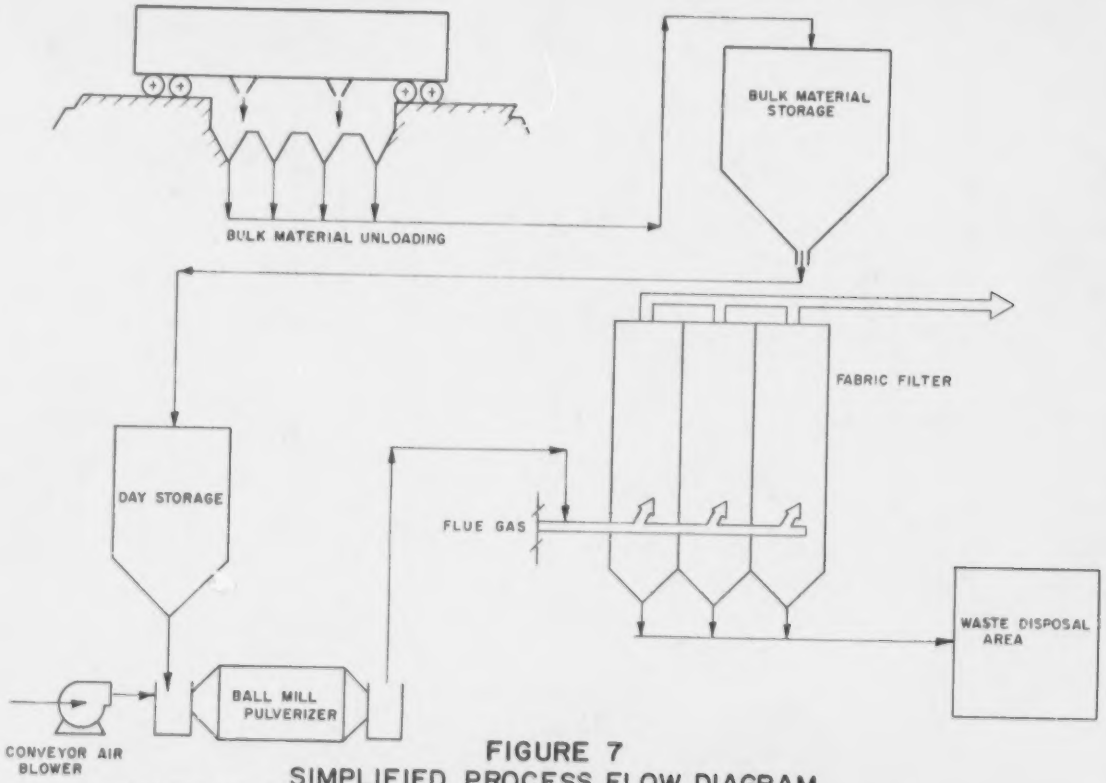

FIGURE 7
SIMPLIFIED PROCESS FLOW DIAGRAM
DRY FLUE GAS DESULFURIZATION (DRY INJECTION PROCESS)

SOURCES: ELECTRIC POWER RESEARCH INSTITUTE AND STEARNS-ROGERS CORP.

Appendix 2.

THE SALINITY PROBLEM

Salt and the River

Nature and man are loading the Colorado River with salt* **diminishing the quality of water** available for beneficial use. Flowing through a basin which includes parts of seven states, the Colorado River picks up mineral salts dissolved from geologic formations, hot springs, and other sources. Farms, homes, and industries withdraw water for use, increasing salt concentrations in the remaining flow. Each use that takes water from and returns it to the river adds new salts, increasing the salinity problem. When the Colorado reaches Imperial Dam, 20 miles north of the U.S.-Mexico border, its salinity level is 16 times higher than at its source.

The river's total salt load fluctuates annually with the overall basin's annual water supply (about 14 million acre-feet), but an average 9 to 10 million tons of salt reach Hoover Dam each year. Depending on the level of development, by the year 2010, between **2.1 and 2.8 million tons of water-borne salt--enough to cover 1 square mile to a depth of 1-1/2 feet--**will have to be removed from the river annually to meet Federal water quality standards and protect the integrity of water quality agreements with Mexico.

Currently, salt damage robs Colorado River Basin water users of approximately **$110 million yearly**, with damages expected to mount, without controls, to nearly $270 million (constant 1982 dollars) by 2010. Municipal and industrial water users suffer an estimated 70 percent of the loss, with the remaining 30 percent borne by agricultural users. Every milligram per liter (mg/L) increase in salinity at Imperial Dam is expected to cause an additional half million dollars in damage each year when salinity concentrations reach the 875 to 1225 mg/L range.

Not reflected in economic terms are damages in Mexico nor the subtle water changes that may adversely affect human and animal health.

Without effective controls for the Colorado River, salinity will soon reach **unacceptable levels**, preventing Basin States from putting their water allotments to best use and endangering the integrity of agreements with Mexico.

Legislation and Authority

The need for salinity control for the Colorado River has been recognized and addressed in Federal legislation and in agreements made pursuant to the international treaty.

*Total dissolved solids

The AQUATRAIN Project takes its **objective of controlling salinity** from the 1974 Colorado River Basin Salinity Control Act (Public Law 93-320).

Title II of that Act directed the Secretary of the Interior to contruct four salinity control units and to expedite completion of planning on Colorado River Water Quality Improvement Program salinity control units to maintain and protect water quality from further degradation in the U.S. and Mexico.

Salinity Control Alternatives

In many years of unusually heavy spring runoff and rainfall, such as 1983, pollution caused by salinity is reduced naturally by dilution. But high water years are the exception rather than the norm in the arid West and cannot be relied on to solve long-term salinity problems. The Bureau of Reclamation is studying a number of alternatives for salinity control, such as cloud seeding which would dilute salinity by adding more rainfall and snowmelt to the Colorado River. Other alternatives would intercept saline water from sources before it enters the river. Many alternatives can be used in concert to achieve salinity control goals and improve water quality in the Colorado River.

Reclamation's Colorado River Water Quality Improvement Program focuses on **reducing salt load** by controlling agricultural, point, and diffuse salinity sources. **Agricultural source control** is being done in cooperation with the U.S. Department of Agriculture. Work includes efforts to control water leakage from canals and to limit water percolation through saline soils caused by farm operations (percolation causes the water to leach salt as it moves over and through the soil). **Point source control** involves collection and treatment or disposal of flows from localized areas such as mineral springs, geysers, and abandoned oil wells. **Diffuse source control** includes watershed management, land treatment, and collection and disposal of irrigation return flows.

Several **alternatives to dispose of saline water** are being explored, including injecting the saline water into deep wells, evaporating it from lined ponds, improving farm operating procedures, lining canals, and processing in desalination plants.

All agricultural source units planned, plus those under construction, would extract about one-half (1.2 million tons) of the 2.1 to 2.8 million tons of salt required for annual removal by the year 2010. The remainder of the salt removal objective must be attained by using or disposing of about one-half of the 600,000 acre-feet of saline water that enters the river each year. If all potential opportunities are implemented, the proposed AQUATRAIN collection and transport system would intercept a significant portion of that amount--nearly 200,000 acre-feet of saline water. AQUATRAIN could **extract as much**

as one-fourth to one-third (more than 900,000 tons) of the annual salt load required for removal to meet water quality standards.

Staged construction is being considered to match use of salt water to schedule requirements for salinity control. Emphasis is being placed on identifying potential beneficial uses which are closest to the sources of saline water. By minimizing the distance that the water must be moved, the costs of salinity control can be balanced with revenues available from a part of commodity transportation savings.

Potential opportunities proposed by AQUATRAIN have been discussed with groups that would use the saline water, and responses have been positive. Formal approval and support from identified users will be sought when more detailed cost and technical evaluations are developed. When firm proposals are available, it is anticipated that government agencies will work together in addressing water rights issues associated with the project.

In the Colorado River Water Quality Improvement Program, several techniques can be used in concert to achieve maximum water quality benefits and to preserve the finite amount of water in the river. AQUATRAIN appears to be an **attractive saline water use alternative** in terms of timeliness, cost-effectiveness, and beneficial use--rather than waste--of saline water.

AQUATRAIN goes **a step beyond** other salinity control measures. The multipurpose pipeline system can turn damaging, polluted water into a usable resource. In a world of finite resoures, this would be a notable accomplishment.

FIGURE 8
WHAT DOES SALINITY IN THE COLORADO RIVER MEAN?

As water moves over and through the earth's crust, it dissolves the salt of naturally occurring minerals. These additions to the water, often referred to as TDS (total dissolved solids), are measured in terms of milligrams per liter (the metric equivalent of parts per million in U.S. measure).

Water Quality Standards		Average Colorado River Salinity Levels (1981)	
Use	In mg/L	Location	In mg/L
Good drinking water	Below 500	Headwaters	50
Municipal & Industrial	Losses begin above 500	Dividing point-- Upper and Lower Basins	513
Agricultural	Losses begin 700-850 and above	Last U.S. Diversion point	806

To illustrate concentrations:

50 mg/L = 1 ounce of TDS in 200 gallons of water
820 mg/L = 3 cups of TDS in 200 gallons of water

The TDS in the Colorado River are expected to increase, possibly reaching 1089 mg/L at the last U.S. diversion point (Imperial Dam) in the year 2010 without control.

One mg/L is equivalent to about 10,000 tons of TDS. Each mg/L increase is expected to cause an additional one half million dollars in damage each year when salinity concentrations reach the 875 to 1225 mg/L range.

Appendix 3.

THE COAL ISSUE

The United States has an estimated **475 billion tons** of known coal reserves. This translates into about three centuries worth of supplies to meet domestic coal energy needs.

To compete with the cost of coal on a BTU basis, oil prices would have to drop to $8 or less per barrel. Furthermore, it is possible that known oil reserves could be depleted within 50 to 100 years; and, with the downward trend in nuclear-fueled electric utilities, energy derived from coal steps to the forefront as America's one solid hope for a **readily available low-cost** energy source.

However, coal must be able to compete economically with other energy sources today if it is to be a fully developed energy resource in the decades to come.

The main problem in further western coal development is transportation costs. With current rail freight rates, it is not economically feasible to fully develop the low-sulfur, high-BTU coal holdings and leases in Colorado, Wyoming, and Utah. As a typical example, the cost of coal at the mine may double by the time it reaches the customer due to freight charges--charges that are ultimately passed on to the consumer (the American public).

Until recently, rail freight rates have continued to rise. During the 5 years just prior to the 1982-83 recession, deregulated rail freights on some shipments have escalated at average annual rates of 20 percent, which results in doubling the rail transportation charges each 3-1/2 years. For comparison purposes, the cost of coal mining has also increased, but those increases have been quite similiar to the national inflation rate.

This present inability to move coal economically, coupled with recession, has caused excess production capacity, mine shutdowns, and a high unemployment rate within the coal industry.

Fully developed technologies to mine coal in a safe and enviromentally sound manner are already well established. Coal-burning technologies are developed, and pollution control techniques continue to progress. However, unless a lower cost transportation system is devised, much of our western coal will not become economically recoverable reserves.

Conceptually, the proposed AQUATRAIN pipeline system could be enlarged and extended to transport over **100 million tons of coal annually** and provide substantially lower freight rates than alternative delivery methods. This savings could for the most part be passed directly to coal customers and consumers. In addition, most of the coal that would be transported is

Federally-leased, and royalties would augment the U.S. Treasury. Low-cost coal would become an attractive alternative for replacing oil and gas currently being used for power generation.

Should AQUATRAIN coal be exported, the lower freight rate would make U.S. coal competitive in the international market and give strong incentive to Pacific-rim countries to again purchase U.S. coal. To utilize our western U.S. coal, these countries currently would have to pay a substantial additional premium above the cost of coal from other countries. AQUATRAIN's lower coal transport rates could result in a **positive impact on the balance of trade** through increased coal sales abroad.

Coal makes up almost 80 percent of total U.S. energy reserves, yet these reserves are being used to meet only about 20 percent of America's energy needs. Oil and gas comprise about 7 percent of total U.S. reserves, yet are being used to meet about 75 percent of our Nation's energy needs. Unless our coal resources become economic, America must continue to rely on imported fuels to fill the gap between reserves and needs.

New coal transportation modes such as AQUATRAIN are positive elements toward **energy independence.**

FIGURE 9
TERMINOLOGY

BTU = British Thermal Unit. One BTU is the heat required to raise 1 pound of water 1 degree Fahrenheit. 10,000 BTU = fossil fuel energy input required to produce one kWh.

kWh = Kilowatt hour. Energy equal to that expended by 1 kilowatt in 1 hour.

1 ton = 2,000 pounds avoirdupois weight (short ton)

1 barrel = 42 gallons.

FIGURE 10
FUEL COMPARISON

Fuel	Approximate Unit Price	Average BTU per Unit Measure (X One Million)	Approximate Price per Million BTU
Northwestern Colorado Coal*	$28/ton at mine mouth	21	$1.30
Imported Crude Oil	$28-$30/barrel at port of entry	5.8	$4.80 - $5.20
Natural Gas	$2.50 to $5.00/ thousand cubic feet (controlled-decontrolled)	1.05 (wet-dry average)	$2.40 - $4.75

*Northwestern Colorado coal is used as an average example of western coal. Coal BTU rating and prices vary somewhat through the western U.S.

GPO 840-864

Senator HECHT. Thank you very much.

STATEMENT OF KEITH H. AINSWORTH, ASSISTANT GENERAL MANAGER, COACHELLA VALLEY WATER DISTRICT, COACHELLA, CALIF.

Mr. AINSWORTH. I have a six-page statement here. I think I can reduce that to about one.

The first part is a description of the water district. It's located in southern California and operated in about three counties, basically in Riverside and San Diego County. It covers about 1,000 square miles and our duties and responsibility in the field of service and water conservation and underground recharge activities, stormwater protective works, irrigation, and Colorado River water delivery to about 76,000 acres from the 122-mile-long Coachella branch of the All-American Canal, agricultural drainage systems, urban and domestic water deliveries from deep wells, and wastewater collection and treatment facilities.

We're at the very end of a long river and the very end of a long canal. I think our water travels further than any other irrigation district up and down the Colorado River.

We have several contracts with the Bureau of Reclamation plus construction of our canal. The last 38 miles of concrete line was completed in 1949 which is about 30 years after our first contract. We've just completed lining the first 50 miles of our canal and water saving is about 132,000 acre-feet. That's being paid for out of water revenues.

Our distribution system to our 78,000 acres is entirely underground, concrete pipe. We serve 3 cubic feet per second to the—of each 40-acre parcel. That delivery is rated by a meter and also—the meter. The buyer pays for his water by the acre foot by the month.

We're also in the ground water recharge business in that—water come from these wells. This is a high quality water but it's limited and we're using—water for recharge. With our native water being about 250 parts per million and using that water, treating it through our sewage treatment plant, that water conceivably can be used about three times before—content beyond the health department requirements. However, with the high salinity in the Colorado River that we're recharging that—with, will limit the number of reuses so we're very interested in maintaining the salt content as low as possible. It's higher than we want it right now but we have devised ways and means of living with it economically at the present level.

Our agriculture in our area is basically off-season type crops and specialty crops which demand a high return. Of our $30 million investment—the very beginning, we're now selling crops or producing crops, about $149.64 million per year and if the salinity were to increase then the specialty crops, our low saline type crops such as citrus, we would then have to revert to the low tolerance type crops, sugar beets, alfalfa, corn, which are crops that are already in overproduction.

I think basically, Mr. Chairman, that's my statement unless there are some other questions you might have.

On our systems for agricultural portion of our valley, we have seen since 1950 the requirement of increasing our entire line spacing from about 330 feet to 150 feet in some cases because of the increased salinity that occurred over the past few years requiring the farmer to use about another half an acre-foot per year for salt balance purposes. But I would think, Mr. Chairman, that if all the irrigation projects up and down the river had the salt control facilities that our district has, we'd be in fine condition.

[The prepared statement of Mr. Ainsworth follows:]

STATEMENT BEFORE THE SUBCOMMITTEE ON WATER AND POWER
OF THE SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES
IN SUPPORT OF S. 752
PRESENTED IN WASHINGTON, D.C., SEPTEMBER 15, 1983
BY KEITH H. AINSWORTH
COACHELLA VALLEY WATER DISTRICT ASSISTANT GENERAL MANAGER

My name is Keith H. Ainsworth. I am the assistant general manager of the Coachella Valley Water District in California.

The Coachella Valley Water District, headquartered in Coachella, California, was incorporated and formed on January 16, 1918, under the laws of California then designated as the County Water District Act, which act and acts amendatory thereof now constitutes Division 12 of the Water Code of the State of California (Water Code Section 30000 et. seq.).

The Coachella Valley Water District, which has continuously existed and functioned since the date of its formation, is a public agency of the State of California and its functions and responsibilities are governmental and public in nature. Its officers are public officers and its Board of Directors is elected for a fixed term by the qualified electors residing within its boundaries.

The Coachella Valley Water District encompasses the major portion of the Coachella Valley, has approximately 637,491 acres within its boundary and is located in three counties: Riverside, Imperial and San Diego. The present functions of the district include: (1) water conservation and underground recharge activities; (2) stormwater protective works; (3) irrigation and Colorado River water delivery to about 76,000 acres from the 122 mile long Coachella Branch of the All-American Canal; (4) agricultural drainage systems;

(5) urban and domestic water deliveries from deep wells; and (6) wastewater collection and treatment facilities.

Recreation has become a byproduct of district activities. Lake Cahuilla, the 1,500 acre-feet terminal reservoir on the Coachella Canal, is operated by the Riverside County Parks Department as a recreational facility. Several golf courses are built through and around district stormwater facilities and some district-owned flood plain land is incorporated into a nature reserve.

The sole dependence for water in growing crops is placed on water from the Colorado River at Imperial Dam.

In 1981, the Coachella Valley Water District served 78,553 irrigable acres. The district delivered more than 348,000 acre-feet of Colorado River water to 58,203 acres of farmland under irrigation. This land produced crops worth $146.64 million resulting in a gross value per acre of more than $2,500--one of the highest in the country.

Produce from Coachella Valley helps feed the country and the world. To accomplish this, the landowners pledged nearly $34 million to bring in Colorado River water. In 1980, through a contract with the Bureau of Reclamation, a $45 million project was completed to conserve 132,000 acre-feet of water annually through lining of 50 miles of the Coachella Canal. The district's share of the cost is to be repaid to the federal government through water revenues.

Coachella Valley Water District entered into its first contract with the federal government toward getting Colorado River water in 1919. This was under the Kettner Bill for a government survey of the All-American Canal route. In 1921, the district entered into its second contract with the federal government, this time under the Kincaid Bill for a reconnaissance survey of a canal route to Imperial and Coachella Valleys and Boulder Canyon Dam site studies. On October 15, 1934, the district signed a contract with the Bureau of Reclamation for

building the Coachella Branch and common works of the All-American Canal at a cost of $13.5 million. On December 22, 1947, the district approved a $13.5 million contract with the Bureau of Reclamation for construction of the underground distribution system, drainage works and flood protection system. In 1964, voters approved a $7.16 million Rehabilitation and Betterment loan to provide improvements of canal, water delivery system, equalizing and terminal reservoirs.

Construction was started on the Coachella Branch in 1938, but stopped during World War II, resumed in 1944, and completed in June 1948 with the first water being delivered in 1949—30 years after the first contract was signed.

In addition to agricultural irrigation, the Coachella Valley depends on the Colorado River as a source of groundwater replenishment for future urban use.

In 1963 the Coachella Valley Water District and Desert Water Agency, which provides urban water to Palm Springs and adjacent communities, entered into contracts with the State of California for a water supply from the State Water Project to be delivered beginning in 1973. The two agencies' contracts total 61,200 acre-feet annually for urban uses. This water is used to recharge the underground basin because all urban water in the valley comes from wells.

Because works have not been built to bring State Project water to the valley, the two agencies have entered into an exchange agreement with Metropolitan Water District of Southern California (MWD) wherein MWD will take the agencies' allotment of state water and, in exchange, deliver through MWD's Colorado River Aqueduct a similar quantity of Colorado River water for groundwater recharge.

People of the United States and many foreign countries depend, in part, on Coachella Valley farmland irrigated with Colorado River water to provide them with dates, grapes, carrots, sweet corn, citrus and many other foods. In

addition, Colorado River water is needed to supplement the valley's rapidly expanding urban water needs.

I was raised on a farm and have been associated with agriculture all my life. I have served as the watermaster for the irrigation and drainage system in the valley and am thoroughly familiar with the Lower Colorado River Basin's agricultural problems and concerns.

Coachella Valley Water District's irrigation distribution and drainage systems were built with conservation in mind. The entire distribution system and most of the drainage system is underground. We deliver water metered to the high point of every 40 acres through more than 500 miles of pipelines. The entire system is controlled by telemetering which will be computerized within the next few weeks.

The farmers in the Coachella Valley and the other agricultural areas in the service area of the Colorado River have participated in the implementation of onfarm management measures of the type proposed by this legislation and I can tell you that I have seen that these practices are a cost effective means for improved water management and salinity control.

We in the Lower Colorado River Basin have seen the impact of increasing salinity in our water supply. As salinity of the river increases, it requires additional irrigation water to leach the salt from the soil, thus reducing the efficient use of our water supply.

It also requires the closer placement of tile lines for effective drainage. From 1949, when Colorado River water was first delivered to Coachella Valley farmlands, to present, we have seen the need to reduce tile line spacing from 330 feet to 150 feet or less, more than doubling the cost per acre.

Most soils in the western United States contain a large percentage of soluble salts and this is true in Coachella Valley. Because the irrigation

water from the Colorado River also contains large quantities of salt, the problems of irrigation become more complex.

Without taking into consideration maintenance of salt balance, irrigation water is removed from the soil by transpiration and evaporation, leaving most of the salt to accumulate in the root zone.

Leaching, which dissolves and carries the salt downward, is the only successful method of salt removal and is indispensable to successful agriculture. It is accomplished by either ponding the water on the surface of the ground or by application of more irrigation water than the crops' consumptive use requirement. This excess water percolates through the soil, carrying the salts below the root zone and into the farm tile drainage system.

The farmers in Coachella Valley are well trained and are experts in producing crops from the desert soil. Correct irrigation practice and the maintenance of salt balance are probably the most important functions for economic success or failure in an agricultural endeavor in the Coachella Valley.

The increasing salinity of Colorado River water requires more of that water to be applied to accomplish the same leaching function. Farmers today are using about ½ acre-foot more water per acre for leaching than they did in 1950. Beside the additional cost to farmers to purchase more water and provide additional irrigation labor to handle it, the increased water requirement is difficult to meet with the many demands being placed on the over-committed river by other agricultural areas, urban and recreational interests.

The specialty crops grown in Coachella Valley are sensitive to salt in the soil and water. Our agricultural feasibility largely is based upon growing off-season specialty crops; without these we cannot exist in farming. These specialty crops are of high value and if low value salt tolerant crops replace them there would be a great loss to farming within the area.

Increased salinity reduces the productivity of the land, giving smaller yields per acre or forcing a shift to less profitable salt tolerant crops. These salt tolerant crops already are in over production and are in surplus in the agricultural marketplace.

The nation enjoys the many specialized crops, especially winter vegetables grown through irrigated agriculture within the Lower Colorado River Basin. In order to continue to provide the nation with these low cost food stuffs, the ever increasing salinity of the river must be controlled. The present level of salt in the Colorado River, although not as low as we would desire, is manageable. However, further increases in salinity will result in significant detriments to agricultural users in the lower basin.

As I mentioned earlier, we also are using Colorado River water for ground water recharge to help meet Coachella Valley's urban needs. The salinity of the river water is greater than the natural ground water and, while this has not created any health problems or significant economic problems, it has created public relations problems with environmentalists who claim the ground water basin is being degraded. Maintained at present levels, this degradation is not significant, but continued increases in the river's salinity could eventually threaten our recharge program.

Coachella Valley Water District and the agricultural community are committed to significant cost sharing for this vital onfarm program. Not only are individual farmers paying 25 percent of the cost of the onfarm measures, but 25 percent of the federal contribution would be reimbursed from the basin development funds under the proposed legislation.

Senate Bill S. 752, together with Public Law 93-320, offers a basinwide cost effective and efficient program to control the increasing salinity of the Colorado River. I support the statements submitted to the committee by the Colorado River Basin Salinity Control Forum and Myron B. Holburt, chief engineer of the Colorado River Board of California and I, on behalf of farmers in the Coachella Valley and in the lower basin, urge the passage of S. 752.

On behalf of the Coachella Valley Water District, I thank you for the opportunity to present this statement.

STATEMENT OF JAMES KRIEGER, DIRECTOR OF CONTRACT ADMINISTRATION, METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA, LOS ANGELES, CALIF.

Mr. KRIEGER. Thank you Senator. I'm James Krieger, I represent the Metropolitan Water District of Southern California.

You have a copy of our full statement and I will simply try to summarize that.

As you probably know Metropolitan serves about 13 million people in southern California and we have about 800,000 feet of water annually from the river under normal conditions. We have three basic concerns with the use of high salinity water within our service area.

First, and I'm sure this has been documented, high salinity water is corrosive and it affects, adversely affects, plumbing fixtures, appliances, within our service area and of course the service area of others that have high saline water.

Second I'm sure you are aware that southern California ground water basins are essential resources that we use to balance our supplies. In order to use those basins effectively you have to be able to store water and you have to rely on that water in times of deficiency. It's therefore extremely important to maintain the salt balances within those groundwater basins so that they can be used effectively as storage facilities.

If the salt content of our imported supplies gets too high then you're unable to spread that water and use that water to replace your ground water basins and therefore we cannot use our ground water resources. So for that reason we are interested in reducing the salinity of the Colorado River.

The potential impact on southern California is that we use the water. In most cases we try to reuse our water as much as possible because of our limited imported supplies. To the extent that the water that we import is high in salt content, we have the opportunity only to reuse that water once.

Obviously if we can reduce the saline content of the water then we have more opportunity to reclaim and reuse the water more times and for that reason we are interested in reducing the salinity of our imported supplies.

We have read the statements of the Salinity Control Forum. We concur completely with their views and we strongly urge you to support the passage of S. 752.

[The prepared statement of Mr. Krieger follows:]

28-181 O - 84 - 18

STATEMENT OF
JAMES KRIEGER
DIRECTOR OF CONTRACT ADMINISTRATION
METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA
P.O. BOX 54153
LOS ANGELES, CALIFORNIA 90054
(213) 250-6000

STATEMENT OF THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA REGARDING SENATE BILL S. 752*

My name is James Krieger. I am Director of Contract Administration for the Metropolitan Water District of Southern California. Metropolitan is a wholesale water district that imports and distributes water to the coastal plain of Southern California. Metropolitan is composed of 27 member agencies located in six counties. Within Metropolitan's service area there are over 130 cities and almost 13 million people, which is over one-half of the population of the State of California.

The function of the Metropolitan Water District is to supply the supplemental water demands of its member agencies; that is, the demands that cannot be met from their own local supplies. The total amount of water used for all purposes within Metropolitan's service area is currently about 3.3 million acre-feet per year. In normal years Metropolitan supplies about one-half of this demand from its two sources of imported water. One is the Colorado River from which water is conveyed to Southern California by a 242-mile-long aqueduct. The other is the California State Water Project. This project conveys water from Northern California to Southern California by means of a 444-mile-long aqueduct.

These two water supplies differ markedly in their salinities. The total dissolved solids (TDS) of the State project water averages around 300 milligrams per liter (mg/l).

*Presented before the Subcommittee on Water and Power of the Senate Committee on Energy and Natural Resources on September 15, 1983.

while the TDS of the Colorado River water is slightly more than 700 mg/l. The two supplies are normally blended to achieve a TDS of about 500 mg/l for the water supplied to most of Metropolitan's service area. The TDS of the blended water is equal to the maximum recommended limit of 500 mg/l under the Secondary Drinking Water Standards of the Safe Drinking Water Act.

Because of our considerable use of Colorado River water, we share the concern of other users about the increasing salinity of the river. We have read the statements being presented today by the Colorado River Board of California and by the Colorado River Basin Salinity Control Forum, and fully support their views.

Metropolitan is primarily concerned about the economic impacts of further increases in the salinity of its Colorado River supply on the urban water users in its service area. Detrimental impacts include decreased productivity and increased production costs for industrial users, and reduced life of plumbing, and fixtures, and appliances in the case of household uses.

While the economic impacts of increased salinity on urban water uses are significant, they are nonetheless difficult to evaluate. One of the most recent studies of these impacts

is summarized in a December 1980 report of the Bureau of Reclamation, titled: "Colorado River Salinity--Economic Impacts on Agricultural, Municipal and Industrial Users." Based on salinity damages given in this report, the economic detriments for both Colorado River water and State project water were determined in 1981 dollars.

The incremental damages resulting from the use of Colorado River water as compared to State project water in Metropolitan's service area were calculated to be about $105 per acre-foot. This is based on the present TDS of Colorado River water. Any increase in the TDS level would result in even greater damages. Thus the damages that occur in Metropolitan's service area from the import of 800,000 acre-feet of Colorado River water, as compared to the use of State project water, amount to $84 million annually, based on the information given in the cited report.

The use of high-salinity water increases the total demand for water by both agriculture and industry. Irrigation uses are increased because of the need for additional leaching to prevent salt buildup in the root zone of crops. It has been estimated by Metropolitan that the use of Colorado River water in lieu of State project water will increase industrial water demand by between 25,000 and 50,000 acre-feet per year as a result of diminished reuse potential.

Another detrimental consequence of Colorado River water's high salinity is that its use may result in violation of the basin water quality control plans prepared under the Clean Water Act. The increase in salinity of Colorado River water after a single use could violate effluent limitations, as well as the water quality objectives for groundwater if treated wastewater is put in spreading basins for groundwater replenishment. This could result in decreased groundwater replenishment and a further reduction in the dependable water supplies for Metropolitan's service area.

Still another detrimental effect of the use of saline Colorado River water in Southern California has to do with the reuse of reclaimed wastewater for purposes other than groundwater replenishment. Since each use of water adds from 250 to 300 mg/l of minerals to a water supply, the lower the initial TDS the more times the water may be reused before it must be discarded or desalinated. Current efforts to increase the reuse of wastewater in Southern California could be inhibited if the salinity of Metropolitan's blended water supply gets too high as a result of the increased salinity of Colorado River water.

The Metropolitan Water District is in full support of Senate Bill S. 752. We believe it is essential to California and to the United States that the Colorado River salinity standards established by the Environmental Protection Agency be met. Meeting these standards will not be easy and major efforts by all concerned will be required. The history of this planet is replete with stories of civilizations that disappeared because they failed to recognize and solve salinity problems.

Senator HECHT. Thank you very much and thank you all for traveling great distances to come and testify today.

Let's go on with panel No. 3.

Mr. Stolte.

STATEMENT OF DENNIS C. STOLTE, ASSISTANT DIRECTOR, NATIONAL AFFAIRS, AMERICAN FARM BUREAU FEDERATION, WASHINGTON, D.C.

Mr. STOLTE. Thank you. I'm Dennis Stolte, assistant director of national affairs, for the American Farm Bureau Federation. I have a condensed one page statement for you today.

Thank you for this opportunity.

The Farm Bureau is the largest general farm organization in the United States with a membership of 3.3 million families in 48 States and Puerto Rico. It is a voluntary, non-governmental organization and represents farmers who produce virtually every agricultural commodity in the entire country.

We appreciate the opportunity to present Farm Bureau's views regarding S. 752, to amend the Colorado River Basin Salinity Control Act of 1974.

Higher salinity levels cause decreased crop yields for farmers and require them to alter crop patterns, increase leaching and draining practices, and increase management costs. According to the Bureau of Reclamation, an increase of just 1 milligram of salt per liter of water results in a $141,600 loss by agriculture.

The measure would authorize a more effective onfarm salinity control program through the USDA. The program would be undertaken on a cooperative basis with private landowners. Attempts to use existing USDA programs are not resulting in the progress that could be expected from a tailormade activity.

This legislation would also authorize six new salinity control units to be constructed within the funding ceiling of the 1974 act. One of these units would, for the first time, involve Federal lands under the control of BLM, and another would demonstrate technologies for beneficial disposition and use of saline waste waters.

S. 752 would further the much needed effort of cleaning up the Colorado River which was begun under the Colorado River Basin Salinity Control Act of 1974.

We request that our views be included in the hearing record on this legislation.

Senator HECHT. Thank you very much. If you want to include anything else in the record please feel free.

Mr. Clark.

STATEMENT OF EDWIN H. CLARK II, SENIOR ASSOCIATE, THE CONSERVATION FOUNDATION, WASHINGTON, D.C.

Mr. CLARK. I would also like to summarize a few observations we have and submit something for the record.

I'm Edwin Clark from the Conservation Foundation where I'm directing our water resources program which is looking at some of the issues that are raised in S. 752. I appreciate the opportunity to be here today.

The aspect of S. 752 are those in sections 6 and 8 dealing with water conservation and some dealing with wildlife. I think these are very important sections of this bill. They are important not only to water-conservation sections, not only because they are the most cost effective way of dealing with salinity but because they solve several other problems in the basin as well. The basin is short both in quality and quantity of water, and they will make more water available in quantity. Perhaps more importantly, I think they are the harbinger of what's going to have to be done throughout the West.

We are moving from a period of water development to water management. I think this is an example of where the country is going to have to go.

Beyond that, I think the recognition given in the bill to wildlife values and the impacts of these projects is very important. These are in proposed section 202(b)(4) and 202(c)(2)(b).

Often in western water development we have not recognized the value of the habitat, and much of this has been destroyed. It is in fact very important to the survival of animals and birds. Fifty percent of many terrestial species in western States depend on the wildlife along the rivers and canals and 50 percent of the birds. It's not only important to the indigenous wildlife, but it's very important to the migrating birds that come through that area. They have to rest in these areas.

We have in some of our earlier developments created new—wildlife habitat, inadvertently through the canal seepage. This is somewhat compensated for the loss along the rivers itself. And one of the things we've been concerned about in water conservation out west is the damage that conservation users can do to the newly created habitat, and I wanted to emphasize the importance of those provisions in this bill and commend the people for including them in it.

In brief, there are several elements in the bill that are important not only because of what they will accomplish in the Colorado Basin but because they represent a good start which I hope will be followed in other proposals by the Bureau of Reclamation in recognizing, considering and incorporating water conservation, improved water management, and repairing habitate protection in the project's proposals. In same cases these proposals may not go as far as I would wish.

Nevertheless I want to emphasize to the committee the improtance of these provisions and urge their enactment as part of S. 752.

Senator HECHT. Thank you very much.

Mr. Sampson.

STATEMENT OF NEIL SAMPSON, EXECUTIVE VICE PRESIDENT, NATIONAL ASSOCIATION OF CONSERVATION DISTRICTS, WASHINGTON, D.C.

Mr. SAMPSON. Thank you Mr. Chairman. I am Neil Sampson, executive vice president of the National Association of Conservation Districts and I will summarize my full statement as well.

We support the efforts of S. 752. We feel that it carries on a tradition of work that has been firmly established out in the Colorado River Basin carried on under Public Law 93-320. Some of the USDA work that has gone on with the programs, as you already heard this morning. We think that a basic conclusion that can be drawn from that experience out there is that these kinds of locally operated projects which do use the time tested approach of Federal cost sharing and technical assistance coupled with a delivery system of local conservation districts, work. They work and they work to get improved water management and low salinity in the receiving waters at low cost. That's about all it takes, it seems to me to describe them.

You've heard from the panel that was here this morning. We have a couple of minor technical amendments that we would like for consideration. We would appreciate the mention of developing and implementing these programs in cooperation with those local conservation districts. And the second amendment that we've offered would in fact authorize the Secretary of Agriculture to utilize grants and cooperative agreements with those local units to carry out some of the activities.

The reason for this is that periodically these programs get snagged on either Federal personnel ceilings or the Federal budget problems, and the ability to use grants smooths out the capability to get the money where it's needed and use it effectively.

We commend the committee and the chairman on his concerns with the serious problems facing the agriculture in the arid and semiarid regions of the country. That land is scarcely 12 percent of America's farmland. It's 27 percent of our fruit the last data I had. So it's doubly important in terms of the agricultural productivity of this Nation.

This Nation faces some serious conservation problems today in spite of the program because we have a growing soil erosion problem on the rain-fed croplands and a tremendous hazard of dust bowl caused by the great plains. Let's pull the traditional programs into those critical soil erosion areas. They've been shrinking over the years as budgets have been eaten alive by inflation to the point where they've gotten larger than at any time during the last three decades. So unless we do a special attention program like you're looking at here, we simply won't be able to get the kind of resources to the kind of problems like salinity in the Colorado River Basin that must be given.

You heard the Department of Agriculture testify this morning what they've done, and you heard Mr. Barnett testify that it really hasn't made any difference, it's just been too small. So we feel that S. 752 is an important move forward and we urge its speedy implementation.

Thank you.

[The prepared statement of Mr. Sampson follows:]

STATEMENT
of

Neil Sampson, Executive Vice President, NACD
to

Subcommittee on Water and Power
Senate Committee on Energy and Natural Resources

September 15, 1983
on the

Colorado River Basin Salinity Control Act (S.752)

Mr. Chairman, members of the Committee:

I am Neil Sampson, Executive Vice President of the National Association of Conservation Districts, commonly known as NACD. We represent the 2950 conservation districts in the 50 states, Puerto Rico, the Virgin Islands and the District of Columbia and the 17,000 conservation district officials which serve on the local boards that govern the day-to-day activities of those districts.

Conservation districts are established under state enabling legislation to develop and carry out land and water conservation programs at the local level. Districts coordinate the work of various federal and state agencies in providing assistance to landowners. They are presently providing services to over 2 1/2 million landowners and operators.

Our association is dedicated to encouraging the adoption of conservation methods of farming to protect the long-term productivity of the land. We believe special concern is needed for the future of the irrigated lands of the western United States, because of their particular problems, and also because of their significant contribution to the national agricultural industry.

Irrigated lands produced 27 percent of the value of farm crops harvested in the United States in 1980, on only 12 percent of the harvested acres, so they are absolutely vital if this nation is to retain its high level of farm output.

Conservation districts have been supportive of salinity control efforts through on-farm water management practices for many years. This work is both effective and cost-efficient. We think the work that has been carried out under PL 93-320, the Colorado River Basin Salinity Control Act of 1974, has been a good example. This work has been supplemented by the targeting of funds within the Agricultural Conservation Program, the Conservation Operations Program of SCS, and ARS research. The resulting projects have demonstrated that a concentrated USDA effort can be very effective in addressing the salinity problem.

National Association of Conservation Districts
Rm. 730, 1025 Vermont Ave., N.W., Washington, DC 20005
Phone (202) 347-5995

One of the main features of these projects has been the search for an institutional arrangement that would facilitate rapid acceptance of new irrigation systems and techniques by farmers. This has involved the active participation of the local conservation districts.

The basic conclusion that we draw from this experience is that locally-operated projects, using the time-tested approach of federal cost-sharing and technical assistance delivered through conservation districts, is an effective way to get improved irrigation water management, lower salinity in the receiving waters, and improve efficiency and productivity on the land.

Based on this experience, we support passage of S.752. We think there are some minor amendments that could strengthen the bill and make it more effective, and we have included them for your consideration.

We support exempting salinity control programs from the principles and standards (or any subsequent replacement guidelines). Salinity control programs are primarily water quality control programs, not water resource development projects, and can ill-afford the additional costs created by the extensive planning and review processes invoked by past principles and standards.

The on-farm water management work that needs to be done is very different from the other salinity control work in the Colorado River Salinity Control effort, and we support separating it out as an identifiable program under the Secretary of Agriculture. This would give the program stature, with separate funding, rather than existing as it does today, as a drain on other cost-share programs.

In the budget for FY 84, this Administration proposed to separate the Colorado River Salinity Control Program from the existing programs under which they have been funded, namely ACP and Conservation Operations. We supported this proposal. Unfortunately, the Administration did not prepare a legislative proposal to implement it in time for the Appropriations Committees to act on it for FY 84.

The success of conservation programs conducted through long-term contracts with private landowners and operators has been proven. The Great Plains Program under the leadership of SCS is a prime example. Further, separating the program out from ACP would eliminate the present $3500 per-farm payment limitation that has limited the usefulness of the ACP in salinity control.

We would offer two amendments to the bill which are primarily technical amendments:

a) On page 8, line 4, add the following sentence at the end of the paragraph:

<u>This program will be developed and implemented in cooperation with soil and water conservation districts established under state statutes and/or tribal laws wherever such lands are included within the boundaries of soil and water conservation districts.</u>

This amendment would assure that the type of administrative structure proven so effective in past work would be an integral part of this new program.

b) On page 10, line 9, after the period at the end of the sentence, insert the following additional sentence:

The Secretary may utilize grants or cooperative agreements with conservation districts, local governmental agencies, colleges and universities, or others as appropriate to carry out the activities identified in subsection 202(c)(2).

This amendment would prevent problems whenever federal personnel ceilings might preclude implementation of the on-farm program unless personnel are diverted from other areas of the country. This proposed provision would give USDA an alternative in management that we feel is more acceptable than adding more federal personnel to the payroll.

Mr. Chairman, we commend the Committee on its concerns with the serious problems facing irrigated agriculture in the semi-arid and arid regions of the country. We are also pleased that you recognize this as a problem which must be solved at the local level, through a specific program effort. The nation faces many serious conservation problems today, led by a growing soil erosion problem on our rainfed croplands, and an impending Dust Bowl caused by the plow-out of marginal lands in the Great Plains. The traditional soil and water conservation programs of the Department of Agriculture have been allowed to shrink until they have less buying power today than at any time in the past three decades. Under those conditions, problems of a special or regional nature, such as the salinity control problem, will simply go unaddressed unless a special effort is made on them. We think S.752 offers such an effort, and urge its speedy adoption.

STATEMENT OF J. W. "PAT" O'MEARA, EXECUTIVE VICE PRESIDENT, NATIONAL WATER RESOURCE ASSOCIATION, WASHINGTON, D.C.

Mr. O'MEARA. Thank you, Senator.

I'm Pat O'Meara. I'm the executive vice president of the National Water Resource Association. We're a confederation of the State water associations in the 17 reclamation States and Hawaii. As these witnesses who have appeared before me, I will be pleased to summarize my statement and tell you that I'm here today in support of S. 752 and also would like to go on record in support of S. 483 and S. 1027.

I think the fact that all 14 Senators of the 17 Basin States have now cosponsored this bill underscores its importance, and I thank you, Senator Hecht, for being one of those sponsors.

I would like to read a resolution that our association adopted in our last national convention in Salt Lake City. I'll read it because it's very brief. It's our resolution 82-5, Colorado River salinity control.

To urge that the Congress of the United States adopt legislation augmenting measures to control Colorado River Salinity authorized in the 1974 Colorado River Basin Salinity Control Act, in order to maintain numeric salinity criteria established by the Seven Colorado River Basin States and approved by the U.S. Environmental Protection Agency, in a cost effective manner.

In my statement Senator, I liken salinity of the Colorado River to cancer and it's a cancer that exists in the river that needs to be eradicated.

Since we do not have the technology to eradicate it, at least I hope we can move forward fast enough to put it in motion.

You've had volumes of expert testimony in support of this bill at this hearing this morning and so I would not go into the details of

some of the activities that could be conducted. But I think that one aspect of this program that has been overlooked in the testimony this morning is the amount of money we are spending as the U.S. Government to control the salinity of the water as it flows into Mexico. Senator Nickles expressed some concern this morning when he learned due to indexing the present authorization brings us up to something over $300 million. We've also reached that same amount of money for control of the river as it flows into Mexico. I think the U.S. interests in the Colorado River Basin are at least entitled to equal treatment.

Whatever we do with this program will also have a beneficial effect on the water as it crosses the border. And we've gone further than that. This Government has agreed to pay the cost of reducing the salinity in Mexico. The people of the river basin States have agreed to cost sharing to bring this program forward because they recognize its great importance. And not only as a program but as an investment because we recognize as others have said, if we can reduce the salinity of the river, we also have enormous impacts on the utilization of that water because salinity has an enormous adverse impact.

There's another benefit, and I would like to say this to the chairman of the subcommittee, that I know in his own State of Oklahoma they have some enormous salinity problems there. The little town of Freedom, Okla., has some seeps that are equal in salinity to the salinity of Great Salt Lake which is a saturated solution. In other words, it could get no saltier. Unfortunately the seeps of Oklahoma are not extensive enough to be commercial, but they are certainly great enough to cause some problems.

What we learn in the Colorado River Basin hopefully can have great use and applications to other areas in the country where we suffer saline probiems.

With that Senator, I conclude my testimony.

[The prepared statement of Mr. O'Meara follows:]

Statement
of
J.W."Pat" O'Meara
Executive Vice President
National Water Resources Association
before the
Subcommittee on Water and Power Resources
of the
Committee on Energy and Natural Resources
United States Senate

September 15, 1983

Mr. Chairman and Members of the Committee, my name is Pat O'Meara. I am here today representing the National Water Resources Association. NWRA is a confederation of the State water resources associations in the seventeen Reclamation States and Hawaii. At our last national convention, the delegates to that convention in Salt Lake City, Utah, adopted the following resolution:

> Resolution 82-5, Colorado River Salinity Control
> To urge that the Congress of the United States adopt legislation augmenting measures to control Colorado River salinity authorized in the 1974 Colorado River Basin Salinity Control Act (Public Law 93-320), in order to maintain numeric salinity criteria established by the Seven Colorado River Basin States and approved by the U.S. Environmental Protection Agency, in a cost effective manner.

In view of that directive, I am here today to support the early enactment of S. 752.

Cancer is a disease that is very difficult to detect in its early stages, but the earlier it is detected, the better the chance of survival. The survival rate of cancer victims is far better today than even a decade ago. Thanks to extensive research and programs for the practical application of that research by the medical profession.

No, Senator, I'm not reading from the wrong script. I just think what I have said about cancer is descriptive of the problems we have with salinity.

The Colorado River was saline ages before the Spanish Conquistadors ever reached its banks, for the river drains on area where natural salinity abounds.

Just as man can increase his chances of being stricken by cancer by smoking cigarettes, breathing asbestos polluted air or drinking water contaminated with carcinigens, so also can man compound his problems with salinity.

For example, years ago some wildcat oil wells were punched in the region. A couple of these resulted in saline artesian wells. One of these is named Crystal Geyser and year after year it generously contributes an extra 3,000 tons of salt to the already salt laden river. In our efforts to control and manage the river, we have built some magnificent dams and created some huge reservoirs. But out in that hot arid region on a summer day the evaporation rate on Lake Meade can be as much as one foot. Since only fresh water is evaporated, the salt content of the remaining water becomes more concentrated.

At Lees Ferry, the dividing point between the Upper and Lower Colorado River Basins, the salinity of the water is in the range of 530 dissolved parts of salt per million parts of water (ppm). The Public Health Service has said that good drinking water should not contain more than 500 ppm and water containing 1,000 ppm should not be used for human consumption.

As water is removed from the river to irrigate thirsty lands, it dissolves some of the natural salts in the soil. Thus the irrigation return flows also make a generous contribution to the rising salinity of the river.

By the time the Colorado River water reaches Imperial Dam, the last diversion point in the U.S., the salinity of the river has increased to the range of 775-800 ppm.

In about 1969 two events had an enormous impact on the salinity of the Colorado River as it flowed across our border into Mexico. Glen Canyon Dam was completed, which enabled the river managers to control the flow of the river into Mexico at the rate agreed to by treaty at 1.5 million acre feet annually. At about the same time, the Welton-Mohawk Irrigation District in Arizona, just north of the US-Mexico border, went into operation. The initial return flows from this project entered the river at a whopping 6,000 ppm. This last shot of salt into the Colorado increased the salinity of the river as it flowed across the border to about 1,250 ppm.

The Mexicans screamed and I can't say that I blame them, but it brought to light an interesting situation. When the US/Mexico Colorado River Treaty was approved, it was clear from the debate on the floor of the US Senate, that water quality was not a consideration, but it was just as clear from the debate in Mexico that they expected their 1.5 million acre feet of water to be of acceptable quality.

During President Nixon's first term in office, Mexican President Louis Echeveria made an official visit to Washington. He told President Nixon that the salinity of the Colorado River was the number 1 problem between our two countries. At that meeting, responding to President Echeveria's complaint, our President promised some remedial action. He appointed former Attorney General Herbert Brownell as Special Ambassador to study possible solutions and make recommendations to solve the salinity problem.

The Office of Management and Budget recommended that we do nothing. They suggested to Mr. Brownell that we should let Mexico take us to the World Court, which, they estimated, would fine the United States $18 million and this would be the cheapest

course of action. Brownell rejected the suggestion with the comment, "Not if I was on the World Court." Then OMB came forward with another cockeyed idea. Solve the salinity problem by dilution. Simply release more water from storage, with no concern that the water they wanted to release belonged to the States and already had been allocated.

The principal feature of Brownell's final recommendation to President Nixon was the construction of a 100 million gallons per day desalting plant at Yuma to remove sufficient salt from the Welton-Mohawk return flows so that the water flowing into Mexico would be no more saline than the salinity of the river's last point of diversion in the United States which is at the Imperial Dam.

When the bill to authorize the remedial measures was sent to the Congress, OMB was still in the act. They tried to get the measure referred to the Committee on Foreign Relations, but the Committee on Energy and Natural Resources said, "No way!" The reason for the OMB ploy was because they did not want the Congress to address the problems of the Salinity of the Colorado in the United States, but the Congress was not about to solve the Mexican salinity problem and ignore those of US citizens who were plagued by similar problems.

Title I of the Act approved by the Congress addressed the problems downstream from Imperial Dam. However, Title II was added to the bill to address the problems upstream from the Imperial Dam. OMB recommended a veto, but Nixon signed it anyhow, but to this day it is exceptionally difficult to get adequate appropriation requests approved by OMB. Those bean counters never quit!

This nation has made a committment to find a cure for cancer. We have poured millions of dollars into research and we are beginning to get results. In 1974 a law was enacted to develop a cure of the cancer of salinity and in this area too, we are seeing signs of progress. The research conducted to date has opened some new leads that need to be pursued.

I refer to salinity as a cancer because of its adverse impacts. For example, each increase of 1 ppm in the salinity of the Colorado River has a detrimental price tag of $500,000 to Southern California water users. In about two years the Central Arizona Project (CAP) will be completed and the people of the Phoenix/Tucson areas will also be utilizing Colorado River water. One ppm of Boron in the water is sufficient to destroy an avocado crop.

It is a problem we need to solve, and the legislation before the committee today addresses the problem in the Colorado River Basin, but the cancer reaches far beyond the Basin. The Chairman well knows that the problem is severe in parts of Oklahoma and there are problems in Texas, Kansas, South Dakota, Wyoming, Colorado and elsewhere in the West.

What we learn from this program we can readily apply to other problems. So I urge the committee to approve this bill so we can eradicate this difficult and costly problem.

Senator HECHT. I thank you all, and I thank all of you who have traveled great distances at your own expense to appear before us today.

Thank you very much.

The hearing is adjourned.

[Whereupon, at 1:10 p.m., the hearing was adjourned.]

[The report of the EPA on Colorado River Salinity follows:]

REPORT OF THE
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ON
COLORADO RIVER SALINITY
TO THE
SUBCOMMITTEE ON WATER AND POWER
COMMITTEE ON ENERGY AND NATURAL RESOURCES
UNITED STATES SENATE

September 15, 1983

This report reviews the interstate and international impacts of the Colorado River Basin salinity problem, and also summarizes the Environmental Protection Agency's (EPA) involvement with the seven Basin States in the continuing efforts to establish salinity criteria and controls for the Basin. This report also presents EPA's views on S.752, a bill to amend Title II of the Colorado River Basin Salinity Control Act (PL 93-320).

It is important to preface the report by citing the need for Colorado River Basin water both now and in the years to come.

- More than 15 million people in the metropolitan areas in the Basin and adjoining areas, and in Southern California depend on the Colorado River for their drinking water.
- A half-million people in Mexico have an interest, which is guaranteed by international agreement, in the quality and quantity of water from the Colorado River for domestic and agricultural use.
- The agricultural community in the Basin requires quality water for irrigation.
- The future development of the Basin's energy resources would require a greater share of the Basin's water.

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This pressure from literally millions of people who depend on the Basin's water for their life and livelihood has raised the concerns of the Congress, the EPA, and the States over the Basin's water quality.

The report reviews:

- o the vital statistics of the Basin;
- o the water quality obligations to Mexico;
- o the multiple and complex sources of the Basin's salinity problem;
- o the evolution of the Clean Water Act's procedures for setting water quality standards;
- o the cooperative efforts of the Basin states in establishing equitable salinity standards; and
- o EPA's conclusions on meeting the needs of the people who depend on the Colorado River for water.

The report is supplementary to those of the Department of Agriculture and the Department of the Interior. Both Departments work very closely with the seven Basin States of Arizona, California, Colorado, Nevada, New Mexico, Utah and Wyoming to select and implement the programs for protecting Basin waters.

The Basin

The Colorado River Basin covers areas of 42,000 square miles in the United States (approximately one-twelth of our continental land area) and 2,000 square miles in Mexico. The Basin extends 1,400 miles from the Continental Divide in the Rocky Mountains to the Gulf of California.

The Basin itself has a population of about 2.25 million. Through water export projects, it provides either full or supplemental water supplies to more than 15 million people in Southern California, as well as to the major population centers of Denver, Salt Lake City, Las Vegas, Cheyenne, and Albuquerque. With the completion of the Central Arizona Project now underway, more than one million residents of the Phoenix and Tucson areas will also be served.

The economy of the Basin is based on irrigated agriculture, mining, forestry, manufacturing, oil and gas production, and tourism. Approximately 2 1/2 million acres are irrigated within the Basin, and hundreds of thousands of additional acres are irrigated with water exported from the Basin. In Mexico, about one-half million people and 425,000 irrigated acres are served by Colorado River water. The water requirement for development of the Basin's vast oil shale and coal reserves will have great, but as yet undetermined, impact.

The Salinity Problem

Due to natural causes, as well as man's activities, the Colorado carries a large dissolved mineral load with salinity concentrations higher than for most other major rivers.

Generally, salinity of the river increases from its headwaters to its mouth. This increase is the result of two basin processes: salt loading or the addition of salts, and salt concentration caused by reducing the amount of water. Salt loading results from both natural conditions and man's activities. Salt concentration occurs when water is lost through surface evaporation or plant transpiration or when upstream waters with lower salinity concentrations are diverted from the Basin.

Studies of the effects of salt loading and salt concentration in the Colorado River Basin have been conducted over the past 20 years. Although this information is not adequate to precisely identify all the contributing sources of salinity, the studies have identified the major sources of salinity.

One of the major sources of salt is the pickup of mineral salts by surface runoff and ground water inflow. The headwaters, which make up only a small part of the total Basin, run over weather resistant crystalline rocks with very low solubility; so the runoff from the high mountain area has a lower salinity. The watersheds of the lower elevations are made up of sedimentary materials generally having a relatively high solubility; so the runoff from these lands has a higher salinity.

Diversions from the Upper Colorado River Basin into surrounding basins occur at or near the headwaters where the river's water has a very low salt content. This removal of high quality water, even though some salt is also removed from the Basin, results in a salt concentrating effect downstream.

As the river runs southward, the concentration of salt is increased by the loss of water to riparian vegetation and to sizeable evaporation from the water surface of reservoirs and backwater areas. This condition has its greatest impact in the river reach below the Hoover Dam.

Irrigation is the major consumer of water in the Basin and is responsible for the largest man-made increase in salinity. Salt is concentrated when water is removed through evaporation and consumption by irrigated crops, but practically all of the dissolved salt is returned to the river. In many areas, return flows from irrigation also leach salts from the banks and underlying geologic formations which adds to the river's salt load.

A 1974 EPA study[1/] of major salinity problems resulting from irrigation practices cited the Colorado River Basin as having more salinity problem areas than any other river in the Nation. The study reported that nearly 90% of the Colorado's salt load caused by irrigation came from the Upper Basin's 1.6 million acres of irrigated farm land. This acreage, less than 3% of the Upper Basin's land area, generated from 24 to 41 percent of the entire Basin's total salt load of 8.15 million tons (as measured at Lee Ferry, Arizona, between 1941 and 1966).

1/ "Evaluation of Salinity Created by Irrigation Return Flows," EPA, Arthur L. Jenke, January 1974, p. 36-40.

The reduction of salt loads through improvements to irrigation practices and systems should be given top priority consideration. Improved irrigation practices are among the most cost-effective and environmentally preferred salinity control alternatives. For example, one of the most serious salinity sources in the Basin which was identified in EPA's 1974 study is the Grand Valley area at the confluence of the Gunnison River and the Colorado. Here irrigation waters percolate to a highly saline aquifer and are returned to the Colorado due to the high ground water table caused by excessive irrigation. This cycle is estimated to contribute 600,000 tons of salt to the river annually. Thus, Grand Valley's 60,000 irrigated acres (about one-tenth of one percent of the Upper Basin's land area) is contributing 15% of the entire Basin's salt load from irrigated agriculture. Programs to improve irrigation practices in the Grand Valley, with the involvement of the Departments of Agriculture and Interior, are now underway. These involve reduction of water use and irrigation ditch improvements to stop leakage, which result in a reduction of the large salt loads from the Grand Valley.

Reservoir evaporation also contributes to increasing the salt concentration because evaporation removes water, while the salt load is concentrated in a smaller volume of water. Any use, including out-of-basin exports and in-basin uses, which does not return water to the system reduces overall water volume and effectively increases salinity. It should be noted that the consumptive use of saline waters, such as saline springs and irrigation return flows, could reduce salinity.

The Clean Water Act

To bring the EPA actions on the salinity problem of the Colorado River Basin into focus, a background on the evolution of the Clean Water Act is useful.

The Clean Water Act is the result of more than thirty years of continuing recognition of technological advancements in the field of water pollution control. Prior to the 1972 amendments to the Act, the States were required to establish water quality standards for interstate streams within their boundaries. The purpose of these standards was to protect and enhance the quality and productivity of the Nation's interstate waters. These waters are needed to serve a variety of beneficial uses, such as public water supply, recreation and propagation of aquatic life, and industrial and agricultural water supply uses.

With the passage of the 1972 amendments to the Act (then referred to as the Federal Water Pollution Act Amendments of 1972), technology based controls became the primary tool for meeting water quality criteria. The 1972 amendments continued to cast water quality standards as both a goal setting and regulatory tool.

The Water Quality Standards Process

A water quality standard defines the water quality goals for all or part of a water body by designating the use or uses to be made of the water and by setting criteria necessary to protect these uses. States adopt water quality standards to protect public health or welfare, to enhance the quality of water, and to serve the purposes of the Clean Water Act. To "Serve the purposes of

the Act" (as defined in sections 101(a)(2) and 303(c) of the Act) means that water quality standards should, "wherever attainable", provide adequate water quality for the protection and propagation of fish, shellfish and wildlife and for recreation in and on the water, taking into consideration the water's use and value for public water supplies, propagation of fish and wildlife, recreation, agricultural and industrial purposes, and navigation.

Water quality standards are the foundation of a State's water quality management process. The State water quality management process varies from State to State, and the phrase is used here to describe the general mechanism States use to integrate the various programs under the Act into a coherent management framework.

As part of the water quality management process, States define their water quality goals by setting standards for their waters. They design and implement water quality based pollution control programs to ensure that the standards are attained. Water quality standards guide the development of water quality management plans, serve as the basis for waste load allocations and determine the additional reduction in pollutant loading necessary to protect or attain uses where technology-based controls are inadequate. Discharge limits are set and permits are issued to ensure that standards are attained. Also, the attainment of water quality standards serves as a benchmark in evaluating the effectiveness of the water pollution control programs.

The process for the adoption of water quality standards by the States begins at the local level. The States develop the standards, which are then reviewed and approved by EPA. To ensure the continuing appropriateness of the standards, the States are required to review them every three years.

Colorado River Basin Water Quality Standards

Several sessions comprising a "Conference in the Matter of the Pollution of Interstate Water of the Colorado River and its Tributaries" were held during the period of 1966 to 1972. At the seventh session in 1972, the conferees, who were the official representatives of the Basin States, the Departments of Agriculture and the Interior and the Environmental Protection Agency, unanimously adopted recommendations pertaining to salinity problems of the Colorado River. The most significant recommendation stated that:

> "A salinity policy be adopted for the Colorado River system that would have as its objective the maintenance of salinity concentrations at or below levels presently found in the lower main stem. In implementing the salinity policy objective for the Colorado River system the salinity problem must be treated as a basinwide problem that needs to be solved to maintain Lower Basin water salinity at or below present levels while the Upper Basin continues to develop its compact-apportioned waters."

As a result of the 1972 amendments to the Clean Water Act, EPA required the States to develop numeric criteria for salinity on the Colorado River. Consequently, in the fall of 1973, EPA submitted to several of the Colorado River Basin States suggestions regarding proposed requirements and procedures for salinity control in the Colorado River Basin, including the establishment of an interstate organization to develop a salinity control plan.

The Basin States, in response to EPA's suggestion regarding the proposed requirements, and in consideration of several other questions that had been

generated relative to certain sections of the Act, met in 1973, and among other things formed the "Colorado River Basin Salinity Control Forum." The Forum is composed of representatives, appointed by the Governors, from the seven Basin States. The mission of the Forum is to provide a Basin-wide coordinated approach to controlling salinity of the River at acceptable levels. Members of the Forum are from the water quality agencies and the water resources agencies of the State governments.

A statement of position for use in discussing the proposed requirements and procedures for salinity control was adopted in 1973. It stated in part that:

> "The States would establish a mechanism for interstate cooperation called the "Colorado River Basin Salinity Control Forum" and that the Forum would prepare semi-annual reports on the development of numeric criteria and the adoption of such criteria by October 18, 1975. The report of the Secretary of the Interior entitled, "Colorado River Water Quality Improvement Program, February 1972" developed under the auspices of the Enforcement Conferences would continue as the most appropriate plan of implementation for salinity control for the Colorado River system. The objective of the plan was the maintenance of salinity at or below levels found in the lower main stem as of April, 1972, with the Upper Basin States continuing to develop their compact-apportioned waters."

A proposed salinity regulation was published in the Federal Register on June 13, 1974. After hearings in Las Vegas, Nevada, and Denver, Colorado, in August 1974, the final regulation was published on December 18, 1974, in the Federal Register. The regulation sets forth the salinity control policy, procedures and requirements for establishing water quality standards for salinity in the Basin. The EPA considered the Salinity Control Forum (with members

from the seven Colorado River Basin States and representation from EPA and the Departments of Agriculture and the Interior) as the most logical organization for developing a comprehensive salinity control program for the Colorado River Basin. The Forum has developed water quality criteria for salinity based on 1972 levels at three major control points on the River; below Hoover Dam, 723mg/l; below Parker Dam, 747 mg/l; and below Imperial Dam, 879 mg/l. These criteria have withstood court challenge by those who have advocated Stateline salinity criteria (EDF v. Costle, No. 79-2432, CADC.)

Water quality standards, including numeric criteria and a plan of implementation for salinity control, were adopted by the seven Forum member States and approved by EPA in 1975. As required by section 303 of the Act, these standards were reviewed and revised in 1978. At that time, the Forum did not recommend changes in the numeric criteria, but did recommend a number of Federal and non-Federal measures designed to maintain the adopted salinity criteria. The recommendations of the Forum were adopted by all seven of the member States in their water quality standards.

The Forum completed the 1981 review and revision cycle following a series of public meetings and submitted its conclusions to the States in December, 1981. All seven States adopted the revised standards, which did not change any criteria, but did update the plan of implementation. The Forum is now beginning its 1984 review of the standards.

The Basin-wide approach to salinity control developed by the Forum relies upon numeric criteria in the lower main stem to protect water quality in the basin. However, this approach is premised upon the Basin States collectively

acting to accomplish the necessary control measures to maintain salinity at or below the 1972 levels at the control stations. The adoption by all of the Basin States of the Forum's recommended plan of implementation is necessary if the Basin-wide approach is to be effective.

Projections of Future Salinity Concentrations

Salt routing studies for salinity projections were made for the 1975, 1978, and 1981 Forum reports using a model developed by the U.S. Bureau of Reclamation. This model was also used for projecting future salinity concentrations. For the 1981 review, modifications were made to the procedures used in estimating the amount of salt entering the river system under 1979 (base level) conditions of development. These changes were the result of an analysis of salt tonnages associated with inflow to Lake Powell, ungaged inflow from Lees Ferry to Grand Canyon, gains and losses in Lake Powell, and bank storage in Lake Powell. Using the results of these studies, the revised salt load estimate for a flow at Lee Ferry of 14 million acre-feet per year and 1979 conditions is 741,000 tons less than using the procedures used for the 1978 review. The Forum believes that the new model inputs are more accurate.

The average salinity concentrations at each of the three lower main stem control stations for which numeric criteria have been established have not exceeded the numeric criteria since 1972. Salinity concentrations at the three control stations in 1980 were:

	Numeric criteria in mg/l	1980 salinity concentration in mg/l	Salinity concentration below numeric criteria in mg/l
Below Hoover Dam	723	707	-16
Below Parker Dam	747	703	-44
Imperial Dam	879	755 1/	-124

1/ The low salinity concentration for Imperial Dam is the result of excess flows that occurred in 1980.

It is not likely that the numeric criteria will be exceeded during the next 3-year review period. However, an extremely long lead time is required to conduct salinity studies, to complete feasibility reports, to authorize and complete construction, and to achieve full impact at lower main stem stations. Therefore, it is essential to continue efforts to implement expeditiously all feasible salinity control measures.

Planned Implementation of the Water Quality Standards

EPA has placed a high priority on salinity control through its Water Quality Management (WQM) program. The Regional EPA Offices have funded significant projects in Wyoming, Utah, Nevada, California, Arizona, and Colorado that have developed nonpoint source controls. The WQM program has provided data and coordination for discharge permits issued in the Colorado Basin and has provided support to States in developing strategies for focusing their salinity control activities. EPA has also funded, with the States, an Executive Director for the Forum. This grant ended in September 1982 at which time the States agreed to provide complete support for the Forum's Executive Director.

Individually, the Basin States have developed water quality management plans to conform to the requirements of section 208 of the Clean Water Act. The water quality management planning process is continuing. As the plans are updated, and after such changes have been adopted by the States and approved by EPA, those portions of the plans dealing with salinity control have become part of the Basin-wide implementation plan.

It is important that EPA and the other Federal agencies involved in the effort to correct the Colorado salinity problem recognize and make use of the

work of the local, areawide, and State WQM agencies. The planning studies prepared by these agencies under sections 208 and 303 of the Act have shown that many cost-effective measures for salinity control are non-structural. For example, irrigation scheduling has been found to significantly reduce the salinity in irrigation return flows.

EPA's Views on S.752, a Bill to Amend Title II of the Colorado River Basin Salinity Control Act (P.L. 93-320)

S.752 would require the Departments of the Interior and Agriculture to develop cost-effective measures, in consultation with States, local governments, and the private sector, for reducing salinity loadings into the Colorado River system. Measures to be considered include: (1) onfarm water management programs, (2) saline water usage, and (3) a comprehensive program for minimizing salt contributions from lands administered by the Bureau of Land Management.

EPA supports the basic concepts and the approach of this bill, although we defer to USDA and Interior on specific recommendations regarding their respective programs. The bill would:

- o continue the cooperative efforts by Federal, State, and local governments and the private sector included in the WQM plans under the CWA to abate and prevent the concentration of salt in the Colorado River Basin through cost-effective conservation practices;
- o build on a foundation of existing and effective USDA programs and experience gained in the past 48 years since soil conservation programs were established in 1935;
- o maintain a strong emphasis on involving the public and affected government interests in the planning process; and

- provide for a sound planning structure, based on:
  - problem identification,
  - determination of pollution sources and their impacts, and
  - determination of cost-effective controls.

EPA endorses the bill's emphasis on evaluation of such preventive measures as local onfarm control and management practices, rather than treatment facilities. This approach will yield the most cost-effective solutions and is fully consistent with the strategy of the Clean Water Act. The measures proposed would improve water management and conservation, while providing concomitant water quality benefits through the reduction of soil erosion. Also, private individuals' involvement in the programs will be through voluntary participation.

Summary & Conclusion

Through the technical evaluation and analysis needed for setting water quality standards and in developing a water quality management planning process for the Basin, the salinity problem has been confirmed as a potential constraint on future development in the seven State Basin area. In view of the increases in consumptive water use in the Basin, EPA believes that appropriate Federal, State and local programs to reduce salt loading in the Basin should continue to be implemented. The Colorado River is a practical example of the Clean Water Act at work in responding to a major water quality problem. The Act sets out a process for setting standards and follows through with a way to achieve the standards as well. In this instance the Colorado River is important to all aspects of life in the seven State basin area. The water quality standards for the Colorado River have been developed and accepted by the States through

a cooperative public process and have been approved by EPA after a thorough technical review. Through the Forum, EPA was able to work very closely with the States in establishing the standards. EPA also supported the development of water quality management planning processes to achieve and maintain the established standards, and continues to encourage a strong State role in controlling Colorado River salinity.

EPA endorses the cooperative Federal/State efforts which have been developed through the WQM planning process to control salinity problems in the Basin. The USDA's onfarm programs are among the most cost-effective salinity control programs. In some instances, implementation of complementary Department of the Interior programs, especially irrigation management, canal or lateral ditch lining, is a prerequisite to implementation of certain onfarm measures. Therefore, it is critical to closely coordinate these Department of the Interior activities. It is also important that the salinity control opportunities on public lands managed by the Bureau of Land Mangement be evaluated and cost-effective programs implemented.

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